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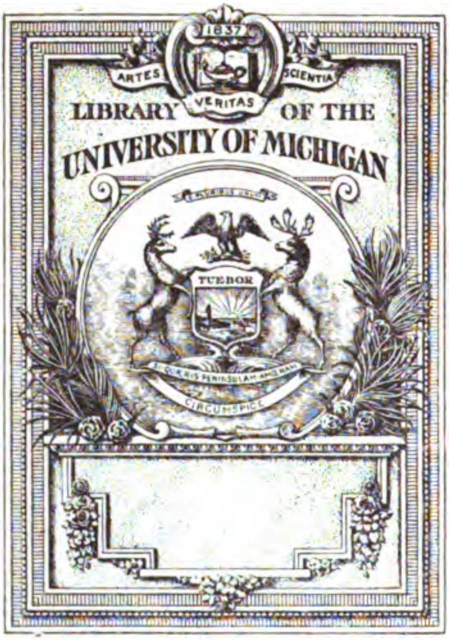
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OBSERVATIONS

ON

REVERSIONARY PAYMENTS,

&c. &c. &c.

VOL. II.

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ON
REVERSIONARY PAYMENTS;
ON
SCHEMES FOR PROVIDING ANNUITIES
FOR WIDOWS, AND FOR PERSONS IN OLD AGE;
ON
THE METHOD OF CALCULATING THE VALUES OF
ASSURANCES ON LIVES;
AND ON
THE NATIONAL DEBT.

ALSO,
ESSAYS on different Subjects in the Doctrine of Life-Annuities and Political Arithmetic;
A Collection of New Tables, and a Postscript on the Population of the Kingdom.

By RICHARD PRICE, D.D. F.R.S.

IN TWO VOLUMES.

THE WHOLE NEW ARRANGED, AND ENLARGED BY THE
ADDITION OF ALGEBRAICAL AND OTHER NOTES,
AND THE SOLUTIONS OF SEVERAL NEW PROBLEMS IN THE
DOCTRINE OF ANNUITIES,

By WILLIAM MORGAN, F.R.S.

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ESSAYS

ON

DIFFERENT SUBJECTS

IN THE

DOCTRINE

OF

LIFE ANNUITIES

AND

POLITICAL ARITHMETIC.

ESSAY I.[*]

Containing Observations on the Expectations *of Lives; the Increase of Mankind; the Number of Inhabitants in* LONDON; *and the Influence of great Towns, on Health and Population.*

IN A LETTER TO BENJAMIN FRANKLIN, ESQ. LL.D. AND F.R.S.

DEAR SIR,

I Beg leave to submit to your perusal the following observations. If you think them of any importance, I shall be obliged to you for communicating them to the Royal Society. You will find, that the chief subject of them is the present state of the city of *London*, with respect to healthfulness and number of inhabitants, so far as it can be collected from the bills of mortality. This is a subject which has been considered by others; but the proper method of calculating from the bills has not, I think, been sufficiently explained.

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[*] This Essay was read to the ROYAL SOCIETY, April 27th, 1769, and has been published in the Philosophical Transactions, Vol. 59. It is here republished with corrections; and with several additions, particularly the *Postcript*.

No competent judgment can be formed of the following observations, without a clear notion of what the writers on *Life-Annuities* and *Reversions* have called the *Expectation of Life*. Perhaps this is not properly understood; and Mr. *De Moivre's* manner of expressing himself about it is very liable to be mistaken.

The most obvious sense of the *expectation* of a given life is, "That particular number "of years which a life of a given age has "an equal chance of enjoying." This is the time that a person may reasonably *expect* to live; for the chances *against* his living longer are greater than those *for* it; and, therefore, he cannot entertain an *expectation* of living longer, consistently with probability. This period does not coincide with what the writers on Annuities call the *expectation of life*, except on the supposition of an uniform decrease in the probabilities of life, as Mr. *Simpson* has observed in his *Select Exercises*, p. 273.—It is necessary to add, that, even on this supposition, it does not coincide with what is called the *expectation of life*, in any case of joint lives. Thus, two lives of 40 have an even chance, according to Mr. *De Moivre's* hypothesis [b], of continuing together only $13\frac{1}{2}$ years. But the *expectation* of two equal joint lives, being (according to the same hypothesis) always a *third* of the *common complement*; it is, in this case, $15\frac{1}{3}$ years. It is necessary, therefore, to observe, that there is another sense of this phrase, which ought to be carefully distinguished from that now mentioned. It may signify, "The *mean continuance* of any given *single*, "*joint*, or *surviving* lives, according to any "given Table of Observations:" that is, the number of years which, taking them one with another, they actually enjoy, and may be considered as sure of enjoying; those who live or survive *beyond* that period, enjoying as much *more* time in proportion to their number, as those who *fall short* of it enjoy *less*. Thus; supposing 46 persons alive, all 40 years of age; and that, according to Mr. *De Moivre's hypothesis*, one will die every year till they are all dead in 46 years; half 46, or 23, will be their *expectation of life*: That is, The number of years enjoyed by them all, will be just the same as if every one of them had lived 23 years, and then died; so that, supposing no interest of money, there would be no difference in value between annuities payable for life to every single person in such a set, and equal annuities payable to another equal set of persons of the same common age, supposed to be all sure of living just 23 years and no more.

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[b] See the Notes in page 2 and 39, Vol. I.

In like manner; the *third* of 46 years, or 15 years and 4 months[c], is the *expectation* of two joint lives both 40; and this is also the *expectation* of the survivor. That is; supposing a set of marriages between persons all 40, they will, one with another, last just this time; and the survivors will last the same time. And annuities payable during the continuance of such marriages would, supposing no interest of money, be of exactly the same value with annuities to begin at the extinction of such marriages, and to be paid, during life, to the survivors.—In adding together the years which any great number of such marriages and their survivorships have lasted, the sums would be found to be equal.

One is naturally led to understand the *expectation* of life in the first of the senses now explained, when, by Mr. *Simpson* and Mr. *De Moivre*, it is called, *the number of years which, upon an equality of chance, a person may expect to enjoy*; or, *the time which a person of a given age may justly expect to continue in being*; and, in the last sense, when it is called, *the share of life due to a person*. But, as in reality it is always used in the last of these senses, the former language should not be applied to it: And it is in this last sense that it coincides with the *sums* of the *present* probabilities, that any given single or joint lives shall attain to the end of the

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[c] See Note (K) at the end of Volume I.

1st, 2d, 3d, &c. *moments*, from this time to the end of their possible existence; or (in the case of survivorships) with the sum of the probabilities, that there shall be a survivor at the end of the 1st, 2d, 3d, &c. moments, from the present time to the end of the possible existence of survivorship. This coincidence every one conversant in these subjects must see, upon reflecting, that both these senses give the true present value of a life-annuity, secured by land, without interest of money[a].

This period in joint lives, I have observed, is never the same with the period which they have an equal chance of enjoying; and in single lives, I have observed, they are the same only on the supposition of an uniform decrease of the probabilities of life. If this decrease, instead of being always uniform, is *accelerated* in the last stages of life; the former period, in single lives, will be *less* than the latter; if *retarded*, it will be *greater*.

It is necessary to add, that the number expressing the former period, multiplied by the number of single or joint lives whose expectation it is, added annually to a society or town, gives the whole number living together, to which such an annual addition would in time grow. Thus; since 19, or the third of 57, is the *expectation* of two joint lives whose common age is 29, or common *complement* 57; twenty marriages every year between persons of this age would, in 57 years, grow to 20 times 19, or 380 marriages always existing together. The number of *survivors* also arising from these marriages, and always in life together, would, in twice 57 years, increase to the same number. And, since the *expectation* of a single life is always half its *complement*; in 57 years likewise, 20 single persons aged 29, added annually to a town, would increase to 20 times 28.5 or 570; and, when arrived at this number, the deaths every year will just equal the accessions, and no further increase be possible.

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[a] See Note (K) at the end of Volume I.

It appears from hence, that the particular proportion that becomes extinct every year, out of the whole number constantly existing together of single or joint lives, must, wherever this number undergoes no variation, be exactly the same with the *expectation* of those lives, at the time when their existence commenced. Thus; were it found that a 19th part of all the marriages among any bodies of men, whose numbers do not vary, are dissolved every year by the deaths of either the husband or wife, it would appear that 19 was, at the time they were contracted, the *expectation* of these marriages. In like manner; were it found in a society, limited to a fixed number of members, that a 28th part dies annually out of the whole number of members, it would appear that 28 was their common expectation of life at the time they entered. So likewise; were it found in any town or district, where the number of births and burials are equal, that a 20th or 30th part of the inhabitants die annually, it would appear, that 20 or 30 was the *expectation* of a child just born in that town or district. These *expectations*, therefore, for all single lives, are easily found by a *Table of Observations*, shewing the number that die annually at all ages, out of a given number alive at those ages; and the general rule for this purpose, is "to divide the sum of all the living in "the Table, at the age whose expectation "is required, and at all greater ages, by "the sum of all that die annually at that "age, and above it; or, which is the same, "by the number (in the Table) of the living "at that age; and half unity subtracted "from the quotient will be the required "*expectation*[e]." Thus, in Dr. *Halley's* Table, the sum of all the living at 20 and upwards, is 20,724. The number living at that age is 598; and the former number divided by the latter, and half unity [f] subtracted from the quotient, gives 34.16 for the *expectation* of 20. The expectation of the same life by Mr. *Simpson's* Table, formed from the bills of mortality of *London*, is 28.9[g].

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[e] This rule, and also rules for finding in all cases the expectations of joint lives and survivorships, may be deduced with great ease, by having recourse to the doctrine of fluxions. In this method, Mr. *De Moivre* says, he discovered them. See note (K) Vol. I. where an account is given of these deductions, omitted by Mr. *De Moivre*.

These

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[f] If we conceive the *recruit* necessary to supply the *waste* of every year to be made always at the *end* of the year, the *dividend* ought to be the *medium* between the numbers living at the *beginning* and the *end* of the year. That is, it ought to be taken *less* than the sum of the living in the Table at and above the given age, by *half* the number that die in the year; the effect of which *diminution* will be the same with the *subtraction* here directed.—The reason of this subtraction will be further explained, in the beginning of the 2d Essay.

[g] It appears in p. 4 and 5, that the *expectations* of *single* and *joint* lives are the same with the values of *annuities* on these lives, supposing no interest or improvement of money.—In considering this subject, it will, probably, occur to some, that, allowing interest for money, the values of lives must be the same with the values of annuities *certain* for a number of years equal to the *expectations* of the lives. But care must be taken not to fall into this mistake. The latter values are always greater than the former: And the reason is, that, though a number of *single* or *joint* lives of given ages will, among them, enjoy a *given* number of years, yet some of them will enjoy a much *greater*, and some a much *less* number of years. Thus; 100 marriages among persons, all 29, would, as I have said, one with another, exist 19 years; and an office bound to pay annuities to such marriages during their continuance, might reckon upon making 19 payments for each marriage. But then, many of these payments would not be made till the end of 30, and some not till the end of 40 years. And it is apparent, that on account of the greater value of *quick* than *late* payments, when money *bears* interest, 19 payments so made cannot be worth as much, as the same number of

payments

These observations bring me to the principal point which I have had all along in view. They suggest to us an easy method of finding the number of inhabitants in a place, from a *Table of Observations* or the *bills of mortality* for that place, supposing the yearly births and burials equal. "Find by "the Table in the way just described, the "*expectation* of an infant just born; and this, "multiplied by the number of yearly births, "will be the number of inhabitants." At *Breslaw*, according to Dr. *Halley's* Table, though half die under 16, and therefore an infant just born has an *equal chance* of living only 16 years; yet his *expectation*, found by the

payments made regularly at the end of every year, till in 19 years they are all made.

This observation might be employed, to demonstrate further, the error of those who have maintained, that the value of a given life is the same with the value of an annuity certain, for as many years as the life has an equal chance of existing. Were this true, an annuity on a life, supposed to be exposed to such danger in a particular year as to create an equal chance whether it will not fail that year, would, at the beginning of the year, be worth *nothing*, though supposed to be sure of continuing for ever, if it escaped that danger: Nor, in general, would the values of annuities on a set of lives be at all affected by any alterations in the rate of mortality among them, provided these alterations were such, as did not affect the period during which they had an equal chance of existing.—But there can be no occasion for taking notice of an opinion, which has been embraced only by persons ignorant of mathematics, and plainly unacquainted with the genuine principles of calculation on this subject.—See a pamphlet on Life-Annuities by *Weyman Lee*, Esq. of the *Inner Temple.*

the rule I have given, is near 28 years; and this, multiplied by 1238, the number born annually, gives 34,664, the number of inhabitants. In like manner, it appears from Mr. *Simpson's* Tables, that, though an infant just born in *London* has not an *equal chance* of living 3 years, his *expectation* is 19 years and a quarter. Let us reckon it as high as 20 years. This number, multiplied by the yearly births, would give the number of inhabitants in *London*, were the births and burials equal.—The medium of the yearly births, for ten years, from 1759 to 1768, was 15,710. And 15,710 multiplied by 20, gives 314,200; which is the number of inhabitants that there would be in *London*, according to the Bills, were the yearly burials no more than equal to the births: that is, were it to support itself in its number of inhabitants, without any supply from the country. But for the period I have mentioned, the burials were, at an average, 22,956, and exceeded the christenings 7,246. This is, therefore, the yearly addition of people to *London* from other parts of the kingdom, by whom it is kept up. Suppose them to be all, one with another, persons who have, when they remove to *London*, an *expectation* of life equal to 30 years. That is; suppose them to be all of the age of 18 or 20, a supposition certainly far beyond the truth. From hence will arise, according to what has been before observed, an addition of 30 multiplied by 7,246; that is, 217,380 inhabitants. This number, added to the former, makes 531,580; and this, I think, at most, would be the number of inhabitants in *London* were the bills perfect. But it is certain, that they give the number of births and burials too little. There are many burial places which are never brought into the bills. Many also emigrate to the navy and army and country; and these ought to be added to the number of deaths. What the deficiencies arising from hence are, cannot be determined[h]. Suppose them equivalent to 6000 every year in the births, and

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[h] Two whole parishes are omitted in the bills, or *Marybone* and *Pancras* parishes. The former of these parishes is now one of the largest in *London*. The annual medium of burials in it for five years to 1771, was 780. In *Pancras* parish this medium for the same period was 322. From an accurate account taken in March 1772 of that part of this last parish which joins to *London*, it appeared that the number of inhabitants was then 3479, of whom 1594 were lodgers, and that the number of houses was 476, of which about 330 had been built in seven years. Mr. *Wales*, in a pamphlet of which more notice will be taken presently, gives the annual medium of *burials*, for 5 years to 1779, in *Marybone* parish 4145; of *births* 1008. In *Pancras*, he gives the *burials* for the same period, 339: the *births*, 234. (*a*)

(*a*) Since the time in which this note was written in 1783, the number of houses in each of these parishes has been immensely increased; and it appears from the Survey made in 1801 in pursuance of an Act of Parliament "for taking an account of the population of Great Britain," that in Marybone the inhabitants amounted to 63,982, and in Pancras to 31,779, making together 95,761; and from the survey made in the last year (1811) that they amounted to a much greater number. M.

6000

6000 in the burials. This would make an addition of 20 times 6000, or 120,000, to the last number; and the whole number of inhabitants would be 651,580. If the burials are deficient only two thirds of this number, or 4000; and the births the whole of it; 20 multiplied by 6000, must be added to 314,290, on account of the defects in the births: and, since the excess of the burials above the births will then be only 5,246; 30 multiplied by 5,246 or 157,380, will be the number to be added on this account; and the sum, or number of inhabitants, will be 591,580.—But if, on the contrary, the burials are deficient 6000, and the births only 4000; 80,000 must be added to 314,200, on account of the deficiencies in the births; and 30 multiplied by 9,246, or 277,380, on account of the excess of the burials above the births; and the whole number of inhabitants will be 671,580.

Every supposition in these calculations is too high. *Emigrants* from *London* are, in particular, allowed the same *expectation* of continuance in *London* with those who are born in it, or who come to it in the firmest part of life, and never afterwards leave it; whereas it is not credible that the former *expectation* should be so much as half the latter. But I have a further reason for thinking that this calculation gives too high numbers, which has with me irresistible weight. It has been seen, that the number of inhabitants comes out less on the supposition, that the defects in the christenings are greater than those in the burials. Now it seems evident that this is really the case; and, as it is a fact not attended to, I will endeavour to explain distinctly the reason which proves it.

The proportion of the number of births in *London*, to the number who live to be 10 years of age, is, by the Bills, 16 to 5. Any one may find this to be true, by subtracting the *annual medium* of those who have died under 10 for some years past[1]; from the *annual medium* of births for the same number of years.—Now, though without doubt *London* is very fatal to children, yet it seems incredible that it should be so fatal as this implies. The *Bills*, therefore, probably, give the number of those who die under 10 too great in proportion to the number of births; and there can be no other cause of this, than a greater deficiency in the *births* than in the *burials*. Were the deficiencies in both equal; that is, were the *burials*, in proportion to their number, just as deficient as the *births* are in proportion to *their* number, the proportion of those who reach 10 years of age to the number born, would be right in the *Bills*, let the deficiencies themselves be ever so considerable. On the contrary; were the deficiencies in the *burials* greater than in the

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[1] That is, for some years before the date of this letter in 1769.

births, this proportion would be given too great; and it is only when the former are least, that this proportion can be given too little.—Thus; let the number of annual *burials* be 23,000; of *births* 15,700; and the number dying annually under 10, 10,800. Then 4,900 will reach 10, of 15,700 born annually; that is, 5 out of 16. —Were there no deficiencies in the *burials*, and were it fact that only *half* the number born die under 10; it would follow, that there was an annual deficiency equal to 4,900 subtracted from 10,800, or 5,900, in the *births*.—Were the *births* a third part too little, and the *burials* also a third too little, the true number of *births*, *burials*, and of *children dying under* 10, would be 20,933—30,666—and 14,400; and, therefore, the number that would live to 10 years of age, would be 6,533 out of 20,933, or 5 out of 16 as before.—Were the *births* a third part, and the *burials* so much as two-fifths wrong, the number of *births*, *burials*, and children dying under 10 would be 20,933—32,200—and 15,120. And, therefore, the number that would live to 10 would be 5,813 out of 20,933, or five out of 18.—Were the *births* a third part wrong, and the *burials* but a sixth, the foregoing numbers would be 20,933—26,833—12,600; and therefore, the number that would live to 10 would be 8,333 out of 20,933, or 5 out of 12.56: and this proportion seems as low as is consistent with probability. It is somewhat less than the proportion in Mr. *Simpson's* Table of *London Observations*; and much less than the proportion in the Table of *Observations* for *Breslaw*. The deficiencies, therefore, in the register of *births*, must be greater than those in the register of *burials*[k]; and the least number I have given, or 591,580[l] is nearest to the true number of inhabitants. However, should any one, after all, think that it

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[k] One obvious reason of this fact is, that *none* of the *births* among *Jews*, *Quakers*, *Papists*, and the *three denominations of Dissenters* are included in the Bills, whereas *many* of their *burials* are. It is further to be attended to, that the abortive and still-born, amounting to about 600 annually, are included in the burials, but never in the births. If we add these to the christenings, preserving the burials the same, the proportion of the born according to the Bills, who have reached ten, for sixteen years, from 1756 to 1771, will be very nearly one *third* instead of *five sixteenths*.

[l] Mr. *Wales*, the ingenious master of the royal mathematical school in *Christ's Hospital*, has lately, in a pamphlet entitled, *An Enquiry into the present State of the Population of England and Wales*, made several remarks on the Observations in this Essay. He objects particularly to this calculation, and expresses, p. 12, his surprize that it should have escaped my attention, that if the births are considerably more deficient than the burials, the expectation of life by which the number of these births is multiplied will be greater, particularly at this time, when the number of births approaches so much nearer than it did to the number of burials.——But Mr. *Wales* should have observed, that in order to be certain of not making the number of inhabitants in *London* less than it is, I have all along in this calculation reckoned the expectation of a child at birth in *London* so high as 20 years; and that this is a greater expectation than such a child could have, according to the Bills from 1759

1759 to 1768, supposing the deficiencies in the christenings so considerable as a third, while in the *burials* they were only a sixth.——In page 15th, he says, that according to my Tables for *London*, formed on the supposition that the burials exceed the births a *fourth*, the expectation of a child just born in *London* is 20 years and three quarters.—Had Mr. *Wales* attended more to this subject, he would have found, that in reality this expectation is no more than 18; and that 20 and three quarters is the expectation, according to my Tables, not of a child just born in *London*, but of all the inhabitants of *London* at the time they enter it. See the 2d Essay towards the middle, and the Tables for *London* in the Collection of Tables.——He would also have found that even in the present improved state of *London* it is not possible, without assuming suppositions which are perfectly extravagant, to frame a table from the Bills that shall give the expectation of a child at birth in *London* much more than 20. He *intimates*, however, that it may *now* approach even to 25¼; but *concludes*, tho' he could not stop to make the calculation, that it cannot be less than 24. He will see how wrong he has been in drawing this conclusion, if he will consult the Essay, and the Tables to which I have just referred. The 16th Table, in particular, gives the probabilities of life between 8 and 16 higher than (according to Mr. *Wales's* account) they have been found to be among the children in *Christ's Hospital* for 20 years before 1781. It gives them likewise too high *after* 20; and yet even this Table makes the expectation of a child just born in *London* only 19¼.——Mr. *Wales*, in consequence of concluding without calculation this expectation to be 24, makes the inhabitants of *London* to be 625,131.——Had he taken it at 20, he would have taken it higher than it is, and by proceeding on his own principles found that the inhabitants of *London* cannot be so many as 528,869.

I cannot conclude this Note without adding, that though it appears from hence, that Mr. *Wales* has been much it is not improbable that only 5 of 16 should live in *London* to be 10 years of age: or that above *two-thirds* die under this age; the consequence will still be, that the foregoing calculation has been carried too high. For it will from hence follow, that the *expectation* of a child just born in *London* must be far short of the number at which I have taken it, or of 20 years.—It is only 19$\frac{1}{4}$ on the supposition that half die under 3 years of age, and that 5 of 16 live to be 29 years of age, agreeably to Mr. *Simpson's* Table. But if it is indeed true, that *half* die under 2 years of age, and 5 of 16 under 10, agreeably to the *Bills*, this expectation cannot be so much as 17; and all the numbers before given will be considerably reduced.

Upon the whole: I am forced to conclude from these observations, that the second number I have given, or 651,580, though short of the number of inhabitants commonly supposed in *London*, is, very probably, much *greater*, but cannot be *less*, than the true number. Indeed, it is in general evident, that in cases of this kind numbers are very much over-rated. The ingenious Dr. *Brakenridge*, 14 years ago, when the Bills were lower than they are now, from the number of houses, and allowing

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much too hasty in some of his remarks, yet I think myself obliged to him for them. It will come in my way to take notice of more of them in the course of this work.

six to a house, made the number of inhabitants 751,800. But he has taken the number of houses much greater than it really is; and six to a house is probably too large an allowance[m].

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[m] Vid. Phil. Transactions, Vol. xlviii. p. 788. In a paper subsequent to this, read to the Royal Society in March 1758, Dr. *Brakenridge* tells us, that in a late survey it appeared, that in all *Middlesex*, *London*, *Westminster*, and *Southwark*, there were 87,614 houses, of which 19,324 were cottages, and 4810 empty. And he acknowledges, that this, if right, proves *London* to be much less populous than he had made it. See Phil. Trans. Vol. L. p. 471.—Mr. *Maitland* gives two accounts of the number of houses within the Bills. One carefully taken from the books of all the parishes and precincts belonging to *London*; and another taken from a particular survey in 1737, made by himself with incredible pains. The first account makes the number of houses 85,805. The second account makes it 95,968. (*b*) And the reason of the difference he observes, is, that many landlords of small places paying all taxes, they are in the parish books reckoned as so many single houses, though each of them contains several houses. See Mr. *Maitland's* History of *London*, 2d Book at the end.—It will be observed presently, that the number of inhabitants in *London* in 1737, was considerably greater than it is now.

From a Table which I have given at the end of this Essay, containing the results of actual surveys of the number of inhabitants, houses, and families in many different places, it will appear that *six* to a house is probably too large an allowance for LONDON; and that certainly *five* to a house is an allowance sufficiently large for ENGLAND in general. And this will prove that Dr. *Brakenridge*

(*b*) By the late Survey in 1801, the number of inhabited houses within the Bills of mortality is made to amount to 106,572, and the number of uninhabited houses to 4097, making together 110,669. M.

Another method which Dr. *Brakenridge* took to determine the number of inhabitants in *London* was from the annual number of burials, adding 2000 to the Bills for omissions, and supposing a 30th part to die every year. In order to prove this to be a moderate supposition, he observes that, according to Dr. *Halley's* Observations, a 34th

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kenridge has over-rated the number of people in ENGLAND as well as in LONDON. In a letter to *George Lewis Scott*, Esq. published in 1756 in the Phil. Trans. Vol. xlix. p. 877, he says, that he had been certainly informed that the number of houses rated to the window-tax was 690,000. The number of cottages not rated, he adds, could not exceed 200,000; and from these data, by allowing six to a house, he makes the number of inhabitants in ENGLAND to be 5,340,000.—Dr. *Brakenridge* was much mistaken with respect to the cottages. Their number in 1761 was (according to the returns of the surveyors of the house duties) 276,149; and the whole number of houses in *England* and *Wales* was in the same year 980,692.—In 1777, according to the same returns, the cottages were 251,261, and the whole number of houses 952,734. Let, however, the number of houses then in *England* and *Wales* be reckoned A MILLION; and, allowing *five* to a house, the number of people must have been FIVE MILLIONS.—The inhabitants of IRELAND may, I suppose, be stated at TWO MILLIONS.—The inhabitants of SCOTLAND consisted, in 1754, of between 16,000 and 17,000 *Papists*, and between 1,240,000 and 1,280,000 Protestants, according to an estimate that was made, I am informed, with labour and expence by the Rev. Dr. *Webster*.—It follows, therefore, that the whole number of people in *Britain* and *Ireland* may be about EIGHT MILLIONS AND A HALF, or NINE MILLIONS. In the Supplement I shall have occasion to say more on this subject, and to take notice of the arguments offered by Mr. *Wales* and Mr. *Howlett*, to prove that our population is increasing.

part die every year at *Breslaw.* But this observation was made too inadvertently. The number of annual burials there, according to Dr. *Halley*'s account, was 1174, and the number of inhabitants, as deduced by him from his Table, was 34,000; and therefore a 29th part died every year. Besides; any one may find, that in reality the Table is constructed on the supposition, that the whole number born, or 1238, die every year; from whence it will follow that a 28th part died every year[a]. Dr. *Brakenridge,* therefore, had he attended to this, would have stated a 24th part as the proportion that dies in *London* every year, and this would have taken off 150,000 from the number he has given. But even this must be less than the just proportion. For let three-fourths of all who either die in *London* or migrate from it, be such as have been born in *London*; and let the rest be persons who have removed to *London* from the country, or from foreign nations. The *expectation* of the former, it has been shewn, cannot be 20 years; and 30 years have been allowed to the latter. One with another, then, they will have an *expectation* of 22½ years. That is; one of 22½ will die every year[°]. And, consequently, supposing the annual

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[a] Care should be taken, in considering Dr. *Halley's* Table, not to take the first number in it, or 1000, for so many just born. 1238, he tells us, was the annual medium of births, and 1000 is the number he supposes all living at one year and under. It was inattention to this that led Dr. *Brakenridge* to his mistake.

It will be shewn in the 2d Essay, that the number of the living under 20, is given too high in this table; and from hence it will follow, that more than a 28th part of the inhabitants die at *Breslaw* annually.

[°] The mean number of inhabitants in *Rome*, of all ages and conditions, for ten years ending in 1771, was 158,957. The annual medium of births for the same time was 4851; and of burials 7367. One in 21½, therefore, died annually. See Phil. Trans. Vol. LXV. p. 445. In 1752, the accurate and diligent Mr. *Struyk* took particular pains to determine the number of inhabitants in *Amsterdam*; and the result of his enquiry was, that very probably it did not amount to 200,000. The annual medium of burials for 6 years, from 1747 to 1752, was 8247; and for five years, from 1772 to 1776, it was 8447. One in 24, therefore, died annually.—At *Amsterdam*, there is a great number of Jews, and their burials are not included in the Bills. There must, I suppose, be other deficiencies, and an allowance for these would, I doubt not, increase the proportion of inhabitants who die annually to one in 21 or 22.—At *Dublin*, in the year 1695, the number of inhabitants was found, by an exact survey, to be 40,508. (See Philos. Transactions, No. 261.) I find no account of the annual burials just at that time; but from 1661 to 1681, the medium had been 1613; and from 1715 to 1728 it was 2123. There can, therefore, be no material error in supposing that, in 1695, it was 1800; and this makes 1 in 22 to die annually. See Dr. *Short's Comparative History*, p. 15, and *New Observations*, p. 228.—The annual medium of burials for five years ending in 1775, in *Manchester* and *Salford*, was 973. The number of inhabitants in 1773 was 27,246. About a 28th part, therefore, died annually. But it should be considered here, that *Manchester* increases fast by accessions from the country, and that the effect of such an increase must be to raise the proportion of *inhabitants* to the *deaths* and also the proportion of the *births* and *weddings* to the *burials*, annual recruit from the country to be 7000 ; the number of *births* 3 times 7000 or 21,000, and

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burials, higher than they would otherwise be.—The annual medium of burials at *Stockholm* in *Sweden*, from 1758 to 1763, was 3802. The number of inhabitants in 1763 was 72,979. One in 19 therefore died annually. See a memoir by M. *Vargentin*, in the 15th Vol. of the *Collection Academique*, printed at *Paris* 1772.

Mr. *Maitland*, in his History of *London*, Vol. II. page 744, by a laborious, but too unsatisfactory investigation, makes 1 in 24½ to die in *London* annually; and on the suppositions, that this is the true proportion dying annually, *at all times*, in *London*, and that the deficiencies in the burials (including the burials in *Marybone* and *Pancras* parishes) amounted to 3038 annually; he determines, that the number of inhabitants within the bills was 725,903, in the year 1737.

The number of burials not brought to account in the Bills is, probably, now much greater than either Dr. *Brakenridge* or Mr. *Maitland* suppose it. I have reckoned it so high as 6000, in order to be more sure of not falling below the truth.

It will appear in the 2d Essay, with an evidence little short of demonstration, that, at least, 1 in 20¾ die annually in *London*, and that, consequently, the number of inhabitants, if the burials are 26,000, cannot exceed 539,500.

[p] Mr. *Wales*, though he seems to acknowledge that *formerly* the number of annual recruits from the country to *London* was much greater than it is here supposed, yet reckons that when he wrote on this subject in 1782, it might be fairly stated at no more than 1779, See Mr. *Wales's* Enquiry, p. 16. It may be proper to consider here how improbable it is that such a change as this should have taken place at a time when the communication between *London* and the country has been made so easy as it is, and when also a disposition to migrate to *London* seems to be more prevalent than ever.—But it is unnecessary to insist on this, for in the 2d Essay it will be proved by decisive evidence, that these recruits could not

and the *burials* and *migrations* 28,000 (which are all very high suppositions), the number of

not even then be so little as double the number at which Mr. *Wales* has stated them. It is true indeed, that though the burials have been falling, the christenings have been rising, for several years. But this does not necessarily imply, that the emigrants from the country are less numerous than they were. It may, on the contrary, be owing to a greater afflux of people to *London* in the prolific stages of life occasioning an increase of the christenings, without at present occasioning such an increase of the burials as is sufficient to balance the causes that diminish them. The Lying-in Hospitals lately established in *London* increase the christenings, by drawing many into them to lye-in who reside out of the limits of the Bills; and the burials are diminished by the custom of sending infants to be nursed in the country, by the new burying grounds which have been lately opened, and particularly by an Act of Parliament which we owe to the humanity of Mr. *Hanway*, passed in 1767, and requiring all parish infants to be sent in three weeks into the country to be nursed there for six years.—The improved state of *London* with respect to healthiness might be also here mentioned; but this has been greatly overrated. The values of lives in *London after* the age of 20, are much the same that they were 50 years ago; and there is no evidence to prove, that they are much greater *before* 20. This will be shewn at the end of the 2d Essay, and in the Observations on Table XVI. in this volume.—According to Mr. *Howlett's* account, in p. 91, of his Examination of my Essay on the Population of *England* and *Wales*, above 2000 deaths of children under two years of age have been taken out of the Bills by the Parish Act just mentioned. This probably goes much beyond the truth. Should the true number be only a *thousand*, it will follow that the state of infants in *London* is but little mended. For on this supposition a thousand must be added to the number given in the Bills as dying under two years of age, which will make it near half the number born as it was 20 years ago. But the addition of inhabitants will be, $22\frac{1}{2}$ multiplied by 28,000, or 630,000[q].

I will just mention here one other instance of exaggeration on the present subject.

Mr. *Corbyn Morris*, in his useful *Observations on the past growth and present state of the city of London*, published in 1751, supposes that no more than a 60th part of the inhabitants of *London*, who are above 20, die every year, and from hence he concludes that the number of inhabitants was near a million. In this supposition there was an error of at least one half. According to Dr. *Halley's* Table, it has been shewn, that a 34th part of all at 20 and upwards, die every year at *Breslaw*. In *London*, a 29th part, according to Mr. *Simpson's* Table, and also according to all other Tables of *London* Observations. Had, therefore, Mr. *Morris* stated a 30th part of all above 20 dying annually in *London*, he would have gone beyond the truth, and his conclusion would have been 400,000 less than it is.

Dr. *Brakenridge* observed, that the number of inhabitants, at the time he calculated, was 127,000 less than it had been. The

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of 2000 would make the mortality of infants (supposing parish infants not sent into the country) greater now in *London* than it ever was.

[q] If with Mr. *Wales* the annual recruit is taken at no more than 1779, the inhabitants on the high suppositions here made that the burials are 28,000, the expectations at birth 20, and at migration 30, will, be only 577,790.

Bills have lately advanced a little, but still they are much below what they were from 1717 to 1743. The medium of the annual *births*, for 20 years, from 1716 to 1736, was 18,000, and of *burials* 26,529; and, by calculating from hence on all the same suppositions with those which made 651,580 to be the present number of inhabitants in *London*, it will be found that the number then was 735,840, or 84,260 greater than the number in the present year 1769[r]. *London, therefore*, for the last 30 years, has been decreasing; and though now it is increasing again, yet there

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[r] In the Essay on the Population of *England* and *Wales*, I have mentioned several facts which seem to shew, that even so long ago as the *Revolution*, *London* was more populous than it is at present. The chief of these facts are the following:

First; the returns in 1777 of the surveyors of the house and window duties made the number of houses then in *Southwark*, *Westminster*, *London*, and *all Middlesex*, including cottages and uninhabited houses, to be 90,578.— Sir *William Petty*, in 1687, says, that the number of *houses* (which he expressly distinguishes from *families* in *London* appeared by the register to be 105,315. See his Political Arithmetic, p. 74. His words in p. 79 are, "by "certificate from the hearth-office, I find the houses with- "in the Bills of Mortality to be 105,315." (*) Dr. *Davenant's* account agrees with this, who, from the same hearth-office, gives 111,215 as the number of houses in *London* (exclusive of *Southwark*) *Westminster*, and all *Middlesex*, on Lady-day 1690. See Dr. *Davenant's* Works, Vol. I. p. 38. The annual average of registered burials also for five years before 1690 was considerably greater than it is at present.

This seems as direct evidence as can well be given in a

(*) See Note (*b*), page 20.

point

there is reason to think that the additions lately made to the number of buildings round it, are owing, chiefly to the increase of

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point of this kind. In order to give more weight to the fact last mentioned, I have, in the Essay just referred to, observed that there are twelve parishes now included in the Bills, which were omitted formerly. But Mr. *Wales* has very properly corrected me in this instance by observing, that these parishes at the time they were added to the Bills were *new* parishes formed out of old parishes, which had been always included in the Bills. There is, therefore, no such regard due to this omission as I imagined.—It may be farther observed with respect to the excess of the burials at the Revolution, that the deficiencies in the register of burials are greater now than they were then; and there are two causes that may possibly have produced this effect. First, the opening of some burial places among the *Methodists*, where many are now buried who used to be buried in churches. And, Secondly, the interment out of the Bills of the greater part of the parish-children who die, in consequence of the Act of Parliament mentioned in the note, p. 25.—There are, however, other causes which have lessened these deficiencies; and, particularly, the decrease of the three denominations of Dissenters in *London*. My own recollection, as well as a great deal of other evidence, leave me no room to doubt of this. Mr. *Howlett*, however, in the pamphlet already quoted, asserts the contrary; and gives a list of burials among Dissenters, which makes their number more than three times greater than it was when Mr. *Maitland* published his History of *London*. But this is all a mistake. The principal burying places in his list happen to be places lately opened, to which, partly from a regard to cheapness, not Dissenters only, but people of all sorts are brought to be buried. This is particularly the case with *Coughland's* ground, *Holywell Mount*, and *Britain's* ground, *Whitechapel.*—The chief burying place of Dissenters has always been *Tindall's* ground in *Bunhill Fields*; but even this is by no means confined to Dissenters, of luxury, and the inhabitants requiring more room to live upon[*].

It should be remembered, that the number of inhabitants in *London* is now so much less as I have made it, than it was 40 years ago, on the supposition, that the proportion of the omissions in the *births* to those in the *burials*, was the same then that it is now. But it appears that this is not the fact.— From 1728, (the year when the ages of the dead were first given in the *Bills*) to 1742, near five-sixths of those who were born died under 10, according to the Bills. From

1742

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senters, and the number of burials in it has been for a course of years decreasing; and instead of being as Mr. *Howlett* gives it, 1400 annually, is not a *third* of this number.—In 1779 the exact number was 434, according to an account which has been extracted for me from the Register.

[*] The medium of annual burials in the 97 parishes within the walls was,

From 1655 to 1664,	3264
From 1680 to 1690,	3139
From 1730 to 1740,	2316
From 1758 to 1768,	1620
From 1771 to 1780,	1491
From 1781 to 1784,	1354

This account proves, that though, since 1655, *London* has doubled its inhabitants, yet *within the walls* they have decreased: and so rapidly since 1690, as to be now reduced to less than half.—The like may be observed of the 17 parishes immediately without the walls. Since 1730, these parishes have been decreasing so fast, that the *annual burials* in them have sunk from 8672 to near 4000, which is lower than they were before the year 1660. In *Westminster*, on the contrary, and the

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1742 to 1752 three quarters: and ever since 1752, this proportion has stood nearly as it is now, or at somewhat more than two thirds. The omissions in the *births*, therefore, compared with those in the *burials*, were greater formerly; and this must render the difference between the number of inhabitants now and formerly somewhat less considerable than it may seem to be from the face of the Bills. One reason, why the proportion of the amounts of the *births*, and *burials* in the Bills, comes now nearer than it did, to the true proportion, may, perhaps, be, that the number of Dissenters is lessened[t].

I will add, that it is probable that *London* is now become less fatal to children than it was; and that this is a further circumstance which must reduce the difference I have mentioned; and which is likewise necessary to be joined to the greater deficiencies in the births, in order to account for the very small proportion of children who survived 10 years of age, during the first two of the periods I have specified.—Since 1752, *London* has been

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23 out-parishes in *Middlesex* and *Surrey*, the *annual burials* have since 1660 advanced from about 4000 to 16,000, the medium for some years before 1769.—These facts prove, that the inhabitants of *London* are now much less crowded together than they were. It appears, in particular, that *within the walls* the inhabitants take as much room to live upon as double their number did formerly.

[t] See the end of the Note in p. 27.

thrown more open. The custom of keeping country-houses, and of sending children to be nursed in the country, has prevailed more. But particularly, the destructive use of spirituous liquors among the poor has been checked[u].

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[u] The enquiry in the preceding pages into the number of inhabitants in *London* was first published above twenty-one years ago. Fourteen years ago (or in 1777) the surveyors of the house and window duties were ordered to make returns to the tax-office of the number of houses of *all sorts* in *London*, *Southwark*, *Westminster*, and the county of *Middlesex*. The number returned was 90,570. This seems to leave no room for much dispute. Allowing six to a house, the number of inhabitants *within the Bills*, with the addition of the whole county, will be 543,420. See the Note in p. 17 and 26; and a more particular account in my Essay *on the Population of England from the Revolution to the present time.*

Mr. *Wales*, in the pamphlet quoted in the Notes, p. 17 and p. 24, without taking any notice of these returns, calculates the number of houses and inhabitants in *London* in the following manner.—Mr. *Maitland*, in 1737 (when the registered burials for 20 years had been near 8000 *per ann.* more than they are at present) found the number of houses in *London* to be 95,968. To this number Mr. *Wales* adds 4032, in order to make up 100,000; and by allowing 6½ to each house, finds the number of inhabitants to be 650,000.

Leaving the reader to judge as he pleases of this calculation, I shall reckon myself more out of danger of being wrong in following the documents I have just mentioned, and in stating from them the inhabitants of *London within the Bills*, with the addition of *Pancras* and *Marybone* parishes, at *half a million*.—The annual medium of burials for the five years ending in 1780 was, according to the Bills, 20,743. Add 6000 for omissions, and the number of burials will be 26,743, or a 19th

I have shewn that in *London*, even in its present state, and according to the most mo-

derate

19th part nearly of the inhabitants which is the proportion dying annually at *Stockholm*. See the Note, p. 23.

If the omissions are only 3038, agreeably to the result of Mr. *Maitland's* enquiries, one in 21 will die annually.—Mr. *Howlett*, in his examination already quoted, (published about eight years ago) p. 91, makes the deficiencies in the burials to be much greater than either of these estimates. He reckons that a deficiency of 2100 burials has been occasioned by the Act of Parliament, requiring parish infants to be nursed for six years in the country, which implies that so many now die annually in the country who ought to be included in the Bills. But this is not his meaning; for he says, that of 2800 infants which come annually upon parishes, and are required to be removed in three weeks into the country, only 250 die there in *six years*; whereas 450 die in the *three weeks* before their removal. The deficiency, therefore, in the Bills arising from hence, can be only 250. But this carries us to the contrary extreme, and makes the probabilities of the duration of life among infants, committed by parishes to the care of foster-mothers, to be much greater than were ever known among infants in the best situations.—Mr. *Howlett's* meaning appears to be, that 2100 deaths are *prevented* annually by this Act of Parliament. The observation just made shews, that it is impossible this should be true; but supposing it true, it will be obvious, that a *prevention* of deaths ought not to be reckoned among *deficiencies*; for on the same ground the deaths prevented by cleansing and opening the streets, and other salutary regulations, might be so reckoned.—This Act of Parliament has undoubtedly prevented a great number of deaths. Before it was passed, almost all parish infants died in the first six years. Let us reckon that *now* of 2800 brought annually into workhouses, only a thousand die in this time, after being removed in three weeks into the country to be nursed. This would be a change unspeakably for the

better;

derate computation, half the number born die under *three* years of age. In *Vienna* and *Stockholm*, under *two*. In *Manchester*, under *five*. In *Norwich*, under *five*. In *North-*

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better; and it would imply that the probabilities of the duration of life among them is higher than is common among children in *London*. On this supposition the deficiency under consideration will be a *thousand*; and it will appear that 1100 ought to be taken from Mr. *Howlett's* total of deficiencies. But much greater deductions ought to be made on other accounts.—He gives 2000 as a deficiency occasioned by carrying out so many to be buried in the neighbouring villages, without making any allowance for the burials brought in. He gives also the burials in the *East-India* ships serving abroad; the burials in the *hospitals*, *Northampton-chapel*, *Bunhill*, as all burials of persons residing within the Bills; and thus makes the deficiencies amount to 11,273, and the total of annual burials to 31,941. He farther calculates that the kingdom in general, and *London* in particular, is improved a *tenth* in healthiness; and on this account he adds a tenth to the total just mentioned, and in *this* way makes the number of inhabitants in *London* to be about 800,000.—Such are Mr. *Howlett's* calculations.—In his list of deficiencies he sets down 1400 for the annual Burials in *Bunhill*. From the note in p. 29, it appears that this number is near 1000 greater than the truth. The annual burials at *Northampton-chapel*, *Clerkenwell*, in 1782, he makes to be 2080. The information I received from thence was, that, taking one week with another, they might be then reckoned at 30 in a week, or 1560 in a year. This, probably, Mr. *Howlett* mistook for 40 in a week, and thus has been led to make them 2080 in a year. They were, however, increasing, and every year diminishing more and more the burials in the churches, the lowness of the fees gaining for this burying ground, and the other burying grounds mentioned in the note p. 28, a particular preference among the lower ranks of people.

ampton, under [x] *ten*.—But it appears from *Graunt's* [y] accurate account of the births, weddings, and burials in three country parishes for 90 years; (and also, from Dr. *Short's* collection of observations in his *Comparative History*, and his Treatise, intitled, *New Observations on Town and Country Bills of Mortality*) that in country villages and parishes, the major part live to mature age, and even to marry. In the parish of *Holy-Cross* [z], near *Salop*, it appears from a curious register, which has been kept by the Rev. Mr. *Gorsuch,* the vicar, that of 655 who died there at all ages for 20 years to 1770, near one half lived to 30 years of age: And, by forming a Table of Observations from this register, in the manner which will be described in the next Essay, I find that a child just born in this parish has an expectation of 33 years; and that, in general, under the age of 50, the *expectations* of lives there exceed those in *London,* in the proportion of about 4 to 3.—In the parish of *Ackworth, Yorkshire,* it appears, from an exact account kept by Dr. *Lee,* of the ages at which all died there for 20 years to 1767, that half the inhabitants live to the

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[x] See the Tables in this volume—The whole number buried in the parish church of *Manchester* for six years, from 1773 to 1778, was 4126, of whom 2174 were children under five. But it must be considered, that in this town the births then exceeded the burials, and that consequently the Bills give the proportion dying in childhood too high.

[y] See *Natural and Political Observations on the Bills of Mortality*, by Capt. *John Graunt*, F. R. S.—Also Mr. *Derham's Physico-Theology*, p. 174, where it appears, that in the parish of *Aynho* in *Northamptonshire*, though the *births* had been for 118 years to the marriages as 6 to 1; yet the *burials* had been to the marriages only as 3¾ to 1.

[z] This parish contains in it a village which is a part of the suburbs of *Shrewsbury*. It consists of 1400 acres of arable and pasture land; besides 300 acres taken up by houses and gardens. It is six miles in circumference; half of which lies along the banks of the river *Severn*.—I mention these particulars to shew, that it may be reckoned a *country* parish; though, perhaps, not perfectly so, on account of its nearness to *Shrewsbury*.—The christenings in it exceed the burials in the proportion of 15 to 13: and the number of inhabitants (mostly labouring people) had for 20 years before 1771 kept nearly to 1050, without any considerable increase.—The register of this parish from 1750 to 1760, has been published in the LIId

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LIId volume of the *Philosophical Transactions;* Part I. Art. 25. And a continuation of it from 1760, to 1770, in the LXIst volume, p. 57. It is kept with particular care and accuracy by Mr. *Gorsuch;* and furnishes very useful *data* for determining the values of country lives—It deserves to be mentioned particularly, that no *foreigners* or *strangers,* who happen to die in this parish, or who may be brought into it to be buried, are entered into the register: Nor are any of the fixed inhabitants omitted, though carried out to be buried.

In Nov. 1781, Mr. *Gorsuch* was so kind as to favour me with a continuation of his Observations to 1780, which makes them complete for 30 years. An abstract of them, and a Table of the decrements of life deduced from them; which I reckon one of the most correct that has been ever published, will be found in the Collection of Tables in this Volume. The conclusions mentioned above are confirmed by the addition of these last Observations.

age of 46.—In the province of *Vaud, Switzerland,* consisting of 112,951[a] inhabitants, half live to 41—So great is the difference between the duration of human life in *towns* and in the *country.*—Further evidence for the truth of this observation may be deduced from the account given by Dr. *Thomas Heberden,* and published in the Philosophical Transactions (Vol. LVII. p. 461), *of the increase and mortality of the inhabitants of the island of Madeira.* In this island, it seems, the weddings have been to the births, for 8 years, from 1759 to 1766, as 10 to 48.8; and to the burials, as 10 to 27.5, or 9 to 24.75. Double these proportions, therefore, or the proportion of 20 to 46.8, and of 18 to 24.75, are the proportions of the number marrying annually, to the number born and the number dying. Let one marriage in three be a 2d or[b] 3d marriage on the side of either the man or the woman; or, in other words, let one in six of all that marry be *widows* and *widowers*; and 9 marriages will imply 15 persons who have grown up to maturity, and lived to marry once or oftener; and the proportion of the number marrying annually the first time, to the number dying annually, will be 15 to 24.75, or 3 to 5. It may seem to follow from hence, that in this island three-fifths of those who die have been married: and, consequently, that only two-fifths of the inhabitants die in childhood and celibacy; and this would be a just conclusion were there no increase, or had the births and burials been equal. But it must be remembered, that the general effect of an increase while it is going on in a country, is to render the proportion of persons marrying annually, to the annual deaths, *greater,* and to the annual births *less,* than the true proportion marrying out of any given number born. This proportion generally lies between the other two proportions, but always nearest to the first[c]; and, in the present case, it cannot be so little as one half. Agreeably to this, it appears also from Dr. *Heberden's*

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[a] See the Supplement.

[b] This proportion is taken nearly from fact.—In all *Pomerania,* during 9 years, from 1748 to 1756, the number of persons who married was 56,956; and of these, 10,586 were *widows* and *widowers. Susmilch's* Works, Vol. I. Tables, p. 98.

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[c] In a country where there is no increase or decrease of the inhabitants, and where also life, in its first periods, is so stable, and marriage so much encouraged, that half of all who are born live to be married, the *annual* births and burials must be equal, and also *quadruple* the number of weddings, after allowing for 2d and 3d marriages. Suppose in these circumstances (every thing else remaining the same) the *probabilities of life,* during its first stages, to be improved. In this case, more than *half* the born will live to be married, and an increase will take place. The births will exceed the burials, and both fall below *quadruple* the weddings; or, which is the same, below *double* the number annually married.—Suppose next (the *probabilities of life* and the *encouragement to marriage* remaining the same) the *prolifickness* only of the marriages to be improved. In this case it is plain, that an increase also will take place; but the *annual* births and burials, instead of being less, will now both rise above *quadruple*

quadruple the weddings; and therefore the proportion of the born to that part of the born who marry (being by supposition two to one) will be less than the proportion of either the *annual* births or the *annual* burials, to the number marrying *annually*. Suppose again (the *encouragement to marriage* remaining the same) that the *probabilities of life* and the *prolifickness of marriages* are both improved. In this case, a more rapid increase will take place, or a greater excess of the births above the burials; but at the same time they will keep nearer to *quadruple* the weddings, than if the latter cause only had operated, and produced the same increase.—I should be too minute and tedious, were I to explain these observations at large. It follows from them, that, in every country or situation where, for a course of years, the *burials* have been either *equal to* or *less* than the *births*, and both under *quadruple* the marriages; and also that, wherever the burials are *less* than quadruple the annual marriages, and at the same time the births *greater*, there the major part of all that are born live to marry.

I have shewn how the allowance is to be made for 2d and 3d marriages. Very wrong conclusions will be drawn if this allowance is not made. But it is, in part, compensated by the natural children which are included in the births, and which raise the proportion of the births to the weddings higher than it ought to be, and therefore bring it nearer to the true proportion of the number born *annually*, to those who marry annually, after deducting those who marry a 2d or 3d time.

In drawing conclusions from the proportion of *annual* births and burials, in different situations, some writers on the increase of mankind, have not given due attention to the difference in these proportions, arising from the different circumstances of increase or decrease among a people. One instance of this I have now mentioned; and one further instance of it is necessary to be mentioned. The proportion of *annual* births to weddings has been considered as giving the true number of children derived from

Herberden's account, that the *expectation* of a child just born in *Madeira* is about 39 years; or more than double the expectation of a child just born in *London*. For the number of inhabitants was found, by a survey made in the beginning of the year 1767, to be 64,614. The annual medium of *burials* had been, for eight years, 1293; of *births* 2201. The number of inhabitants, divided by the annual medium of *burials*, gives 49.89; or the *expectation* nearly of a child just born, supposing the *births* had been 1293, and consequently equal to the *burials*, the number of inhabitants remaining the same. And the same number, divided by the annual medium of *births*, gives 29.35; or the *expectation* of a child just born supposing the burials 2201, the number of births and of inhabitants remaining the same. And the true *expectation* of life must be somewhere near the mean between 49.89 and 29.35.

Again: A 50th part of the inhabitants of *Madeira*, it appears, die annually. In *London*, I have shewn, that above twice this

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from each marriage, taking all marriages one with another. But this is true only when, for many years, the births and burials have kept nearly equal. Where there is an excess of the births occasioning an increase, the proportion of *annual* births to weddings must be less than the proportion of children derived from each marriage; and the contrary must take place where there is a decrease.

proportion dies annually. In smaller towns a smaller proportion dies[d]; and the births also come nearer to the burials.—In general; there seems reason to think that in towns (allowing for particular advantages of situation, trade, police, cleanliness, and openness, which some towns may have,) the excess of the burials above the births, and the proportion of inhabitants dying annually, are more or less as the towns are greater or smaller. In *London* itself, about 160 years ago, when it was scarcely a fourth of its present bulk, the births were much nearer to the burials, than they are now. But in country parishes and villages, the births almost always exceed the burials; and I believe it never happens, except in very particular situations, that more than a 40th* part

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[d] In *London*, this proportion is, at the highest, 1 in 20¾.—In *Norwich*, 1 in 24½.—In *Northampton*, 1 in 26⅗. See the next Essay. In the parish of *Newbury*, *Berks*, consisting of 3732 persons, all *town* inhabitants, the annual medium of deaths for 19 years, or from 1747 to 1765, was 136. In this town, therefore, 1 in 27½ die annually. The contiguous parish of *Speen* consisted, in 1757, of 1200 inhabitants, about 520 of whom were inhabitants of that part of the town of *Newbury* which is in this parish, and the rest were *country* inhabitants. For 34 years, or from 1724 to 1757, *thirty-nine* died here *annually*; or 1 in 31.—In both these parishes the births and burials are nearly equal.—I believe these facts may be depended on; and they seem to shew us very distinctly the gradations in the degrees of human mortality from *great* towns to *moderate* towns, and from *moderate* towns to *small* towns, and to parishes consisting partly of town and partly of country inhabitants. The next note will shew what the degree of human mortality is in places purely country.

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* According to *Graunt's* account of a parish in *Hampshire*, not reckoned, he says, remarkably healthful, a 50th part of the inhabitants had died annually for 90 years, *Natural and Political Observations, &c.* Chap. xii.—In the parish of *Ackworth, Yorkshire*, one of 47 die annually. See the register of this parish at the end of the first additional Essay in this volume. In the province of *Vaud, Switzerland*, one in 45 die annually. See the first part of the *Supplement* in this volume. In 1098 country parishes, mentioned by *Susmilch*, the annual average of deaths, for six years ending in 1749, was 5255. The number of inhabitants was 225,357. One, therefore, in 43 died annually.—In 106 other parishes, mentioned by him, this proportion was 1 in 50.

In the dukedom of *Wurtemberg*, the inhabitants, Mr. *Susmilch* says, are numbered every year; and from the average of five years, ending in 1754, it appeared that, taking the towns and country together, 1 in 32 died annually.—In another province, which he mentions, consisting of 635,998 inhabitants, 1 in 33 died annually. From these facts he concludes, that taking a whole country in *gross*, including all cities and villages, mankind enjoy among them about 32 or 33 years each of existence. This, very probably, is below the truth; from whence it will follow, that a child born in a country parish or village, has, at least, an expectation of 36 or 37 years; supposing the proportion of *country* to *town* inhabitants to be as 3½ to 1; which, I think, this ingenious writer's observations prove to be nearly the case in *Pomerania, Brandenburgh*, and some other kingdoms.

In all *Sweden*, consisting in 1763 of 2,446,394 inhabitants, the annual medium of deaths for 9 years, ending in 1763, was 69,125; and therefore one in 35 and two-fifths died annually. The medium of births was 90,245; of marriages 21,220. See the first additional Essay in this volume.—In the kingdom of *Naples*, consisting of 4,311,503 inhabitants in 1777, the medium of deaths for 5 years was 115,412; and therefore one in 37 and a third part of the inhabitants die annually. In the four provinces of *New-England* there is a very rapid increase of the inhabitants; but, notwithstanding this, at *Boston*, the capital, the inhabitants would decrease, were there no supply from the country: For, if the account I have seen is just, from 1731 to 1762, the burials all along exceeded the births[f]. So remarkably do towns, in consequence of their unfavourableness to health, and the luxury which generally prevails in them, check the increase of countries.

Healthfulness and prolifickness are, probably, causes of increase seldom separated. In conformity to this observation, it appears from comparing the births and weddings, in countries and towns where registers of them have been kept, that in the former, marriages, one with another, seldom produce less than four children each; generally between four and five, and sometimes above five[g]. In all *Sweden* the births and weddings

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third died annually. The births were 166,808. *See the Essay on the Population of* England, &c. page 15.

[f] See a particular account of the births and burials in this town from 1731 to 1752 in the *Gentleman's Magazine* for 1753. p. 413.

[g] Any one may see what evidence there is for this, by consulting Dr. *Short's* two books already quoted, and the *Abridgement* of the *Philosophical Transactions*, vol. vii. part 4. p. 46, and *Graunt's* account already quoted of the births, weddings, and burials in three country parishes for 90 years; compared with similar accounts in towns. In considering these accounts, it should not be forgotten that

dings are to one another as $4\frac{1}{4}$ to 1.—In all *Franse* as $4\frac{2}{5}$ to 1. But in towns this proportion is *generally* between 3 and 4 to 1.

I have

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that allowances must be made for the different circumstances of increase or decrease in a place, agreeably to the observations at the end of the note in page 37.

In April 1779 the inhabitants of the parish of *Biddulph*, in *Staffordshire*, were numbered, and found to be 495 males, and 540 females, making 207 families[*]. The annual average of births for 20 years preceding 1780 had been 21.4 males, and 17.5 females, of burials 10.85 males, and 10.3 females; of marriages 6.15.—The same averages for 60 years had been 16.9 males *born* annually and 14.7 females; 9.4 males *buried* annually, and 9.93 females; marriages 5.46.—Taking, therefore, the highest of these averages, it appears that in this parish a 46th part of the *males* die annually, but only a 52d part of the *females*; that the annual births are nearly a 26th part of the inhabitants; and that every marriage, supposing no allowance for illegitimate births, produces six children. This account I owe to an information communicated by the Rev. Mr. *Wilson*, the minister of this parish, to Dr. *Haygarth*, at *Chester*.

The parish of *Swinderby*, in *Lincolnshire*, consisted in June 1771 (as I have learnt from Dr. *Disney*, then the worthy minister of that parish) of 52 families and 224 souls, 95 of whom were heads of families, 87 children, 32 servants, and 10 inmates.—The *births*, *marriages*, and *burials* for 30 years before 1771 had been 199, 47, and 154. The proportion of marriages to births therefore, was 1 to $4\frac{1}{4}$.—A number equal to a 34th of the inhabitants had been born annually, and a 44th part died annually.—The inhabitants of *Okeford*, in *Devonshire*, were in 1770, 422[†]. The average of births for 20 years to 1769 had been 12, and of burials $7\frac{1}{2}$. A 35th part, therefore, was born annually, and a 56th part died.

[*] In 1801 the males were found in this parish to be 569, the females 611, making 237 families. M.

[†] The inhabitants in *Swinderby* and *Okeford*, appear by the survey in 1801, to have amounted respectively, to 254 and 408. M.

From

I have sometimes heard the great number of old people in *London* mentioned, to prove its favourableness to health and long life. But no observation can be more erroneous. There ought, in reality, to be more old people in *London*, in proportion to the number of inhabitants, than in any smaller towns; because at least one quarter of its inhabitants are persons who come into it from the country, in the most robust part of life, and with a much greater probability of living to old age, than if they had come into it in the weakness of infancy. But, notwithstanding this advantage, there are much fewer persons who live to great ages in *London*, than in most other places

From the returns of the Intendants of the different provinces of FRANCE, it appeared, that the annual medium of births in that kingdom for ten years to 1780, had been 940,935; of deaths 818,491; and of marriages 213,774.—See Mr. NECKER on the Administration of the finances of *France*, Vol. I. chap. 9.—The births and marriages were, therefore, in the proportion mentioned in the text. From the last note but one it appears that a 35th part of the inhabitants of a country may be reckoned to die annually. Multiply, therefore, 818,491 by 35, and the kingdom of *France* will appear to have consisted in 1780 of 28 millions and a half of inhabitants. Nor is there any reason to think this to be greater than the true number; for the deaths, as well as the births, and marriages, are probably given too small, it being scarcely possible to avoid omissions in such returns. It appears further from the great excess of births, that the population of *France* was then increasing.—See more on this subject in the *Appendix* to my *Discourse on the Love of our Country*, p. 1.

where observations have been made.—At *Breslaw* it appears, by Dr. *Halley's* Table, that 41 of 1238 born, or a 30th part, live to be 80 years of age. In the parish of *All-saints*, in *Northampton*, an account has been kept ever since 1733 of the ages at which the inhabitants die; and I find that a 22d part die there turned of 80. At *Norwich* a like account has been kept; and it appears, that a 27th part of the inhabitants die turned of the same age.—According to Mr. *Kerseboom's* Table of Observations, published at the end of Mr. *De Moivre's* Treatise on the Doctrine of Chances, a 14th part die turned of 80. And this is the very proportion that died turned of 80 in the parish of *Ackworth*, for the 20 years mentioned page 35. In the parish of *Holy-cross*, already mentioned, p. 34, 1 in 11½, or 2 in 22 of the inhabitants live to 80[h].—But in *London*, for 30 years, ending at the year 1768, only 25 of every 1000, who had died, or a

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[h] This, however, will appear itself inconsiderable, if the following account is true: "In 1761 the burials "in the district of *Christiana*, in *Norway*, amounted "to 6,929, and the christenings to 11,024. Among "those who died, 394, or 1 in 18, had lived to the "age of 90; 63 to the age of 100, and seven to the "age of 101.—In the diocese of *Bergen*, the persons "who died amounted to 2,580, of whom 18 lived to "the age of 100; one woman to the age of 104, and "another woman to the age of 108."

See the *Annual Register* for 1761, p. 191.

40th part, had lived to this age[i]; which may be easily discovered, by dividing the sum of all who have died during these years at all ages, by the sum of all who had died above 80[k].

Among

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[i] For five years to 1780 only one in 46 lived to 80.

[k] In the parish church of *Manchester*, of 4126 buried during six years ending in 1778, a hundred and twenty-nine, or a 32d part, had lived to 80 or more. This proportion would be considerably greater were there no increase of *Manchester*, and no excess of the births above the burials.—The same is true of *Warrington*, in *Lancashire*, where of 2490 buried in eight years ending in 1780, sixty-seven, or a 36th part, had lived to 80 or upwards; and also of the parish of ECCLES in the same county, where of 1123 buried in four years, from 1776 to 1779, fifty-one, or a 22d part, had lived to 80.—In CHESTER, where the births and burials are nearly equal, of 1969 females who died in the course of 9 years, from 1772 to 1780, 149 or a 13th part, had lived to 80; but of *males* only 72 out of 1764, or a 25th part. See the Tables in this Volume. In all SWEDEN, where the births exceed the burials in the proportion of nearly 13 to 10, 710 *females* of 10,000 born (or a 14th part) and 555 *males*, of 10,000 (or an 18th part) live to 80; But in STOCKHOLM only one in a 100 of the *females* born there, and one in 300 of the *males*, live to this age. See the Tables in this Volume.

These facts give a frightful view of the fatality of great towns to human life. A farther account, with answers to some objections, may be found in the first additional Essay on the *difference between the duration of human life in great towns and in country parishes.*

I have said above, that a 40th part of all who die in *London* live to 80. But it should be considered, that a great proportion of those who die in *London* came into it in the firmest parts of life, and that consequently nothing can be from hence determined with respect to the proportion of the *natives* of *London* who live to 80.

This

Among the peculiar evils to which great towns are subject, I might further mention the Plague. Before the year 1666, this dreadful calamity laid *London* almost waste once in every 15 or 20 years; and there is no reason to think, that it was not generally bred within itself. A most happy alteration has taken place; which, perhaps, in part is owing to the greater advantages of cleanliness and openness which *London* has enjoyed since it was rebuilt; and which lately have been very wisely improved.

The facts I have now taken notice of are so important, that I think they deserve more attention than has been hitherto bestowed upon them. Every one knows that the strength of a state consists in the number of people. The encouragement of population, therefore, ought to be one of the first objects of policy in every state, and some of the worst enemies of population are the luxury,

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This must be a much smaller proportion. The corrected Table of Observations for *London* (or Table 15th in this Volume) makes it as 25 to 1518, or as 1 to 60. But even this corrected Table certainly gives the probabilities of living in *London*, at most ages, too high; and were there such accurate *data* for forming a table for *London* as have been furnished by the Observations at *Stockholm*, the rate of mortality in the two cities would not perhaps appear to be very different. More will be said on this subject in the introduction to the Tables in this Volume.

luxury, the licentiousness, and debility produced and propagated by great towns.

I have observed that *London* is now [l] increasing. But it appears, that, in truth, this is an event more to be dreaded than desired. The more *London* increases, the more the rest of the kingdom must be deserted; the fewer hands must be left for agriculture; and, consequently, the less must be the plenty, and the higher the price of all the means of subsistence. *Moderate* towns being seats of refinement, emulation, and arts, may be public advantages. But *great* towns, long before they grow to half the bulk of *London*, become checks on population of too hurtful a nature, nurseries of debauchery and voluptuousness; and, in many respects, greater evils than can be compensated by any advantages[m].

Dr.

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[l] If we may trust the Bills, *London* has decreased since this was written. The annual medium of burials for five years ending in 1770, 1777, and 1780, was 22,688—21,087—and 20,743. The medium for three years to 1780, was 20,445. But this decrease has probably been owing to the causes mentioned in the notes, p. 27 and 28.

[m] The mean annual *births*, *weddings*, and *burials* in the following towns, for some years before 1772, have been nearly,

	Births.	Weddings.	Burials.
At *Paris*,	19.100	4,400	19,400
Vienna, from 1757 to 1769	5,800		6,600

At

Dr. *Heberden* observes that, in *Madeira*, the inhabitants double their own number in 84 years: But this, (as you, Sir, well know) is a very slow increase, compared with that which takes place among our colonies in AMERICA. In the back settlements, where the inhabitants apply themselves entirely to agriculture, and luxury is not known, they double their own number in 15 years; and all through the northern colonies, in 25 years[a]. This is an instance of increase so rapid as to have scarcely any parallel. The births in these countries must exceed the burials much more than in *Madeira*; and a greater proportion of the born must reach maturity.

	Births.	Weddings.	Burials.
At *Amsterdam*, from 1761 to 1770	4,600	2,400	7,922
Copenhagen,	2,700	886	3,300
Berlin, for 5 years ending at 1759	3,855	980	5,054
Stockholm, for nine years ending in 1763	2,535		3,781

It deserves notice, that before 1770, all that died in the hospitals at *Vienna* were omitted in the Bills.—Of the *Paris* Bills a more particular account will be given in the Postscript to this Essay.—The annual medium of burials at *Amsterdam* for 10 years to 1710, was 7,288. For 10 years to 1780, it was 8,710; but three of these last years were reckoned very sickly years.

[a] See a Discourse on *Christian Union*, by Dr. *Styles*, *Boston*, 1761, p. 103, 109, &c.—See also, *The Interest of Great Britain considered with regard to her Colonies, together with Observations concerning the Increase of Mankind, peopling of Countries*, &c. p. 35. 2d edit. *London*, 1761.

—In 1738, the number of inhabitants in *New Jersey* was taken by order of the government, and found to be 47,369. Seven years afterwards, the number of inhabitants was again taken; and found to be increased, by procreation only, above 14,000; and very near one *half* of the inhabitants were found to be under* 16 years of age. In 22 years, therefore, they must have doubled their own number, and the births must have exceeded the burials 2000 annually. As the increase here is much quicker than in *Madeira*, we may be sure that a smaller proportion of the inhabitants must die annually. Let us, however, suppose it the same, or a 50th part. This will make the annual burials to have been, during these seven years, 1000; and annual births 3000; or an 18th part of the inhabitants.—Similar observations may be made on the much quicker increase in *Rhode Island*, as related in the preface to the *Collection of the London Bills of Mortality*; and also in the valuable pamphlet last quoted, on *the Interest of Great Britain with regard to her Colonies*, p. 36.—What a prodigious difference must there be, between the vigour and the happiness of human life in such situations, and in such a place as *London*?—The original number of persons who, in 1643, had settled in *New-England*, was 21,200. Ever since, it is reckoned that more have left them than have gone to them[p]. In the year 1760, they were increased to half a million. They had, therefore, all along doubled their own number in 25 years. It is not probable that they will continue to increase at the same rate; but should this happen they will, 70 years hence, in *New-England* alone, be four millions; and in all the colonies[q], above twice the number of inhabitants in *Great-Britain*[r].—But I am wandering

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* According to Dr. *Halley's* Table, the number of the living under 16, is but a *third* of all the living at all ages.

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[p] See Dr. *Style's* pamphlet, just quoted, p. 110, &c.

[q] In the original letter to Dr. *Franklin*, containing these observations, and communicated by him to the Royal Society (in April 1769), the following words were here added.—“ Formerly an increasing number of “ FRIENDS, but now likely to be converted, by an un-“ just and fatal policy, into an increasing number of “ ENEMIES.”—This reflection was occasioned by the discontents which were then prevalent in the colonies, and which had been produced first by the Stamp Act, and after the repeal of that act, by the duties laid in *America* on tea, paper, glass, &c. When read to the Royal Society, it was softened by the omission of the words “ unjust and fatal policy;” but, notwithstanding this, it gave offence; and was suppressed in all the former publications of these Observations. I need not say how dreadfully the apprehensions expressed by it were afterwards verified.

[r] The rate of increase, supposing the procreative powers the same, depends on two causes: The “ en-“ couragement to marriage;” and the “ *expectation* of “ a child just born.” When one of these is given, the increase will be always in proportion to the other.——That is; as much *greater* or *less* as the *ratio* is of the

numbers

dering from my purpose in this letter. The point I had chiefly in view was, the present state

numbers who reach maturity, and of those who marry, to the number born, so much *quicker* or *slower* will be the increase. Let us suppose the operation of these causes such, as to produce an annual excess of the *births* above the *burials*, equal to a 36th part of the whole number of inhabitants. It may seem to follow from hence that the inhabitants would double their own number in 36 years; and thus some have calculated. But the truth is, that they would double their own number in much less time. Every addition to the number of inhabitants from the births, produces a proportionably greater number of births, and a greater excess of these above the burials; and if we suppose the excess to increase annually at the same rate with the inhabitants, or so as to preserve the *ratio* of it to the number of inhabitants always the same, and call this *ratio* $\frac{1}{r}$, the period of doubling will be the *quotient produced* by dividing the logarithm of 2 by the *difference* between the logarithms of $r + 1$ and r; as might be easily demonstrated.* In the present case, r being 36, and $r + 1$ being 37, the period of doubling comes out 25 years. If r is taken equal to 22, the period of doubling will be 15 years. But it is certain that this ratio may, in many situations be greater than $\frac{1}{22}$; and, instead of remaining the state of *London* as to healthfulness, number of inhabitants, and its influence on population. The observations I have made may, perhaps, help to shew, how the most is to be made of the lights afforded by the *London* Bills; and serve as a specimen of the proper method of calculating from them. It is indeed extremely to be wished, that they were less imperfect than they are, and extended

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* Let a be the number of inhabitants, then will $a + \frac{a}{r} = a \times \frac{r+1}{r}$ be the number at the end of the 1st year, and by the rule of proportion $a \times \overline{\frac{r+1}{r}}\Big|^2$ will be the number at the end of the 2d year, $a \times \overline{\frac{r+1}{r}}\Big|^3$ at the end of the 3d year, and $a \times \overline{\frac{r+1}{r}}\Big|^n$ at the end of the n^{th} year. When the inhabitants are doubled $a \times \overline{\frac{r+1}{r}}\Big|^n$ will be equal to $2a$, or $n \times \overline{\text{Log.}\ \overline{r+1} - \text{Log.}\ r} = \text{Log.}\ 2$, hence we have n (for the required time) $= \frac{\text{Log.}\ 2}{\text{Log.}\ \overline{r+1} - \text{Log.}\ r}$

M.

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the same, or becoming less, it may *increase*, the consequence of which will be, that the period of doubling will be shorter than this rule gives it.—According to Dr. *Halley's* Table, the number of persons between 20 and 42 years of age is a third part of the whole number living at all ages. The prolific part, therefore, of a country may very well be a 4th of the whole number of inhabitants; and supposing four of these, or every other marriage between persons all under 42, to produce *one* birth every year, the annual number of births will be a 16th part of the whole number of people. And, therefore, supposing the burials to be a 48th part, the annual excess of the births above the burials will be a 24th part, and the period of doubling 17 years.

I must not conclude this note without adding a remark to remove an objection which may occur to some in reading Dr. *Heberden's* account of *Madeira*, to which I have referred. In that account 5945 is given as the number of children under seven in the island, at the beginning of the year 1767. The medium of annual births, for eight years, had been 2201; of burials 1293. In six years, therefore, 13,206 must have been born; and if, at the end of six years, no more than 5945 of these were alive, 1210 must have died every year. That is; almost all the burials in the island for six years must have been burials of children under seven years of age. This is plainly incredible; and, therefore, it seems certain, that the number of children under seven years of age must, through some mistake, be given, in that account, 3000 or 4000 too little.

further. More parishes round *London* might be taken into them: and, by an easy improvement in the parish registers now kept, they might be extended through all the parishes and towns in the kingdom. The advantages arising from hence would be very considerable. It would give the precise law according to which human life wastes in its different stages; and thus supply the necessary *data* for computing accurately the values of all *life-annuities* and *reversions*. It would, likewise, shew the different degrees of healthfulness of different situations, mark the progress of population from year to year, keep always in view the number of people in the kingdom, and, in many other respects, furnish instruction of the greatest importance to the state. Mr. *De Moivre*, at the end of his book on the Doctrine of Chances, has recommended a general regulation of this kind; and observed, particularly, that at least it is to be wished, that an account was taken, at proper intervals, of all the living in the kingdom, with their ages and occupations; which would, in some degree, answer most of the purposes I have mentioned.—But, dear Sir, I am sensible it is high time to finish these remarks. I have been carried in them far beyond the limits I at first intended. I always think with pleasure and gratitude of your friendship. The world owes to you many important discoveries; and your name must live as long as there is any knowledge of philosophy among mankind. That you may ever enjoy all that can make you most happy, is the sincere wish of,

SIR,

Your much obliged,

and very humble Servant,

Newington-Green,
April 3, 1769.

RICHARD PRICE.

POSTSCRIPT.

POSTSCRIPT.

AT *Edinburgh*, bills of mortality, of the same kind with those of *London*, have been kept for many years. I have, since the foregoing letter was written, examined these Bills, and formed a Table of Observations from them, as I found them for a period of 20 years, beginning in 1739, and ending in 1758.—As this is a town of moderate bulk, and seems to have a particular advantage of situation; I expected to find the probabilities of life in it, nearly the same with those at *Breslaw*, *Northampton*, and *Norwich*; but I have been surprized to observe that this is not the case. During the period I have mentioned, only one in 42 of all who died at *Edinburgh*, reached 80 years of age.—In general; it appears, that the probabilities of life in this town are much the same, through all the stages of life, with those in *London*, the chief difference being, that after 30, they are rather lower at *Edinburgh*.—It is not difficult to account for this.—It affords, I think, a striking proof of the pernicious effects arising from uncleanliness, and crowding together on one spot too many inhabitants. At *Edinburgh*, Mr. *Maitland* says, "the build-
" ings,

"ings, elsewhere called *houses*, are denominated *lands*, and the *apartments*, in other "places named *stories*, here called *houses*, are "so many freeholds inhabited by different "families; whereby the houses are so excessively crowded with people, that the "inhabitants of this city may be justly presumed to be more numerous than those of "some towns of *triple* its dimensions." See *Maitland's History of Edinburgh*, p. 140.

In the year 1748, the whole number of *apartments* or *families* in the city and liberties of *Edinburgh*, was 9064. This Mr. *Maitland* mentions as the result of particular examination, and undoubtedly right. *Ib.* p. 217, 218.—In 1743, an accurate account was taken, by the desire of this writer, of the number of *families* and *inhabitants* in the parish of *St. Cuthbert. Ib.* p. 171. The number of *families* was 2370, and of *inhabitants* at all ages, 9731. The proportion, therefore, of *inhabitants* to *families*, was 4$\frac{1}{10}$ to 1; and, supposing this the true proportion for the whole town, the number of inhabitants was 4$\frac{1}{10}$, multiplied by 9064, or 37,162. The yearly medium of deaths in the town and liberties for eight years, from 1741 to 1748, was 1783, *Ib.* p. 220 and 222. And, consequently, *one* in 20$\frac{4}{5}$ died annually.

Mr. *Maitland*, though possessed of the *data* from which these conclusions necessarily followed, has made the number of inhabitants 50,120, in consequence of a disposition to exaggerate in these matters, and of assuming, without any reason, a 28th part of the inhabitants as dying annually.

In page 220, he expresses much surprize at finding, that the number of males in this town was less than the number of females, in the proportion of 3 to 4. But this is by no means peculiar to *Edinburgh.*

All I have been saying must be understood of the state of *Edinburgh,* before the year 1758. The Bills, since this year, have been so irregular, and so different from the same Bills for the preceding years, and from all other Bills, that I cannot give them any credit. Either some particular incorrectness has crept into the method of keeping them; or there has been some change in the state of the town which renders them of no use.

From the note in p. 48, it appears, that the christenings and burials at Paris, come very near to equality. This once led me to suspect, that there must be some particular singularity in the state of *Paris,* which rendered it much less prejudicial to health and population than great towns commonly are. But better information has lately obliged me to entertain very different sentiments.—The difference between the births and burials at *Paris,* is much greater than the Bills shew. "Children here are baptized the instant "they are born; and, in a day or two af- "terwards, it is the custom to send them to

" the adjacent villages to be nursed. A " great number, therefore, of the infants born " at *Paris* die in the country, and these ap- " pear only in the register of christenings." See a book entitled the *Police of France*, page 127. And *Buffon's* Natural History, Tom. II. at the end.—" All the children also received " into the *Foundling Hospital*, are immedi- " ately sent to be nursed in the country, at " a distance from *Paris*, where they remain " 5 or 6 years; at the end of which time " they are brought again to *Paris*, the boys " to be placed in the suburbs of *St. Antoine*, " and the girls at the *Salpetriere*, to be fur- " ther maintained till they arrive at the age " of twelve years." *Police of France*, p. 81. —The following passage in the same writer, containing a further account of this Hospital, is important; and therefore, tho' long, I cannot help transcribing it. " Let us sup- " pose, that out of 4000 children annually " carried into the country, two thirds may " die, during the five years they are destined " to remain at nurse; so that only 1333 " would constantly be the annual number " sent back to *Paris*; who, being kept at " the two Hospitals *St. Antoine* and *Salpe- " triere* just mentioned, till they are 12, and " succeeded by a like number each year, the " total number composed of all brought in " the successive years, would make the con- " stant resting stock to amount to 9331. " But of these we will suppose a 5th part "to die every year. Yet even then the constant resting stock of children ought to "be 7465. How greatly then must we be "surprized to find, by the authentic account "taken from their own books, only 640 "boys in the college of St. *Antoine*, and not "more than 600 girls at the *Salpetriere*; so "that the resting stock of returned foundlings "appears to be no more than 1240, which being deducted from 7465, will leave 6225. "What then becomes of these? Are they "reclaimed by their parents? Or do they "perish for want of care? In answer to "which question it was explained to me; "that as many of the lower class of people "were induced to marry, in order to be excused from serving in the militia; so when "these have children, which they are unable to maintain, they usually send them to "this hospital; which, therefore, must be "looked upon, as not only a charity for the "care of exposed and deserted children whose "parents are unknown, but also as a public "*nursery* for the sustenance of the children "of poor people, who, tho' registered at the "office, are often reclaimed from their country nurses by their parents. This accounts, "in some measure, for the small stock of "children brought back to the hospital at "*Paris*. The further difference is suspected to be owing to the insufficient nourishment they receive; as this particular charity, as well as the General Hospital, "adopts that preposterous method of taking "in an unlimited number, while there is "only a limited income for their subsistence." *Ib.* page 83.

These facts prove, that, at the same time that the register of *christenings* at *Paris* must be full, the register of *burials* must be very deficient. Let the deficiencies be reckoned at 3700; and consequently, the annual burials at 23,100. The annual average of weddings, given in p. 48, is 4400, and, therefore, the number of persons who marry annually must be 8800. Deduct a 6th part* for *widows* and *widowers*, and 7134 will be the number of *virgins* and *batchelors* marrying annually. The difference between the christenings and burials is 4000; which, therefore, is the number of annual recruits from the country. These, in general, must be persons in mature life. Suppose 3000 of them to marry after settling at *Paris*. Then, 7134 lessened by 3000, or 4134 will be the number of persons born at *Paris* who grow up to marry; and 14,966, or near *four-fifths* of all who are born at *Paris*, will be the number dying annually in childhood and celibacy. Nor is this at all improbable, for it appears from the most authentic documents that *three-fifths* of all that are born at *Stockholm* die under five years of age. It has been observed in p. 37, &c. that in country parishes above half the inhabitants live to marry.

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* Vid. Note, p. 36.

The suppositions on which I have made this computation for *Paris*, seem moderate; but if any one thinks otherwise, he may make the same calculation on any other suppositions.

The births at *Paris* are above four times the weddings; and it may seem, therefore, that here, as well as in the most healthy country situations, every wedding produces above four children. I have observed nothing like this in any other great town. Many children born in the country are, I suppose,[t] brought to the Foundling-Hospital, and there christened. This Hospital may likewise occasion a more than common number of illegitimate births. And, besides, some who leave the country to settle at *Paris*, may come thither already married. These are circumstances that will swell the register of births, without having any effect on the weddings. I do not, however, know that any of them take place at *Paris*; and, perhaps, it must be granted, that it is distinguished in this respect from most other towns. Nor can I wonder at this, if it be indeed true, not only, that all married men in

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[t] "If the parents of a child brought to this Hospital "are known, the register of its baptism must be pro- "duced. If the parents are unknown, the child must "be baptised after being received." *Police of France*, page 82.

France are excused serving in the militia from whence draughts are made for the army, but also, that a *fifth* of all the children born at *Paris* are sent to the *Foundling-Hospital*[u]. These are encouragements to marriage that no other city enjoys. It has been seen that the *Foundling-Hospital*, though attended with this effect, is, probably, in the highest degree pernicious.

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[u] See the Police of *France*, p. 83.—This writer adds, that a *third* of all that die at *Paris* die in Hospitals. "In "the *Hôtel Dieu* (a great Hospital, situated in the middle "of the city) we may, he says, behold a horrid scene of "misery; for, the beds being too few for the number "admitted, it is common to see 4, or 6, or even 8 in a "bed together, lying 4 at one end and 4 at the other, ill "of various distempers in several degrees; some bad, "others worse; some dying, others dead.—Above a "*fifth* of all admitted to this Hospital die; the annual "numbers admitted being 21,823. The medium of deaths "for three years from 1751 to 1753, 4650.—The medium "of deaths for the same years in *all* the Hospitals was "6181." *Ib.* p. 85.—In our two great city Hospitals, St. *Thomas's* and St. *Bartholomew's*, about 600 die annually; or one in 13 of all admitted as in-patients.—An account of the *Hôtel Dieu* in *Paris*, much the same with that now given, may be found in the *Memoirs of the Year Two Thousand Five Hundred*, lately published, and translated from the *French* by *W. Hooper*, M. D. "A citizen "or stranger (this writer says) who falls sick, and is sent "thither, is imprisoned in a noisome bed, between a "corpse and a person expiring in agonies, to breathe the "noxious vapours from the dead and the dying, and "convert a simple indisposition into a cruel disease.— "Six thousand wretches are crowded together into this "Hospital, where the air has no free circulation; and "the arm of the river which flows by, receives all its "filth, and is drank, abounding with the seeds of corruption, by half the city." The *London* Hospitals, it appears, have greatly the advantage; but indeed, with respect to hospitals in general, *as now constructed and regulated*, I cannot help fearing that they cause more distempers than they cure, and destroy more lives than they save.

At the end of the 2d vol. of Monsieur *De Buffon's Natural History*, there are Tables formed from the Observations of M. *Du Pre de S. Maur*, of the *French Academy*, containing an account of the ages at which 13,189 persons died in three parishes at *Paris*; and also, of the ages at which 10,805 persons died in 12 country parishes and villages near *Paris*.—According to these Tables, many *more* die in the beginning of life, and much *fewer* in the latter part of life, in the country than in *Paris*. But the circumstances of *Paris*, and the country round it, are such, that no argument can be drawn from hence in favour of *Paris*. Many of the children dying in the country, are children sent thither from *Paris* to be nursed; and, on the other hand, *many*, perhaps *most*, of those who die in old age at *Paris*, are persons who have removed thither from the country, some to *Hospitals*, and some to places and settlements. It is evident, therefore, that these Tables give a representation of the probabilities of life at *Paris*, which, when compared with those in

save. See *Thoughts on Hospitals*, by Dr. *Aikin*, together with a Letter to the Author, by Dr. *Percival*.

the adjacent country[x], is just the reverse of the truth. Were the children born at *Paris*, who die in the country, to be transferred to the town register; and, on the contrary, the adults born in the country, who die at *Paris*, to be transferred to the country register, there is no reason to doubt, but that the probabilities of life at *Paris*, would be found as low, in comparison with those in the country, as the probabilities of life in *London* are; or, perhaps, much lower.—This observation is applicable, in some degree, to most other great towns; and, in general, on account of the migrations from the country to towns, navies and armies, we may be satisfied, that we err on the side of *defect*, whenever we judge of the probabilities of life in the *country*, from the numbers dying in the several stages of life; and, on the side of *excess*, whenever, in the same way, we judge of the probabilities of life in *towns*. And this, it is obvious, has a tendency to confirm all that has been said in the preceding Essay, concerning the pernicious effects of great towns on human life.

There are several *ordonnances* and *arrets* of council which fix the boundaries of *Paris*, and prohibit all new buildings beyond those boundaries.—The reasons of this regulation, as set forth in one of these *arrets*, are remarkable; and it will not be improper to recite them.—"By the excessive aggrandizing of the city, it is said, the air would be "rendered unwholesome, and the cleaning "the streets more difficult."—"Augmenting the number of inhabitants would augment the price of provisions, labour, and "manufactures."—"That ground would be "covered with buildings which ought to be "cultivated in raising the necessary subsistence for the inhabitants; and thereby hazard a scarcity."—"The people in the "neighbouring towns and villages would be "tempted to come and fix their residence in "the capital, and desert the country."—"And, lastly; the difficulty of governing so "great a number of people, would occasion "a disorder in the *Police*, and give an opportunity to rogues to commit robberies "and murders[y]."

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[x] It is for this reason that these Tables, when combined, exhibit justly the *mean* probabilities of life for town and country taken together; and that the Table of the *decrements* of life deduced from them by *M. Buffon* and Mr. *Du Pre*, agrees nearly with Dr. *Halley's* Table.

No one can think overgrown cities greater evils than I do. But, yet, I can by no means approve of this policy. The effect of it must be, crowding together too many people within the prescribed boundaries, and rendering a town more the seat of uncleanliness, infection and disease. The number of houses in

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[y] Vid. Police of *France*, p. 130.

Paris is reckoned about 28,000[a], but the number of inhabitants (supposing a 20th part to die annually, and the true number of burials to be 23,000) must be 460,000; or about 16 times the number of houses.

It is happy for LONDON, that there have been no laws to restrain its increase. In consequence of being allowed to extend itself on all sides into the country, the inhabitants now take near twice the room to live upon that they did; and it must be rendered less the means of shortening human life.

In page 49, I have given the annual *medium* of births, weddings, and burials at BERLIN, from 1755 to 1759. In 1747, an account was taken with the utmost care, by the order of the King of PRUSSIA, of the number of inhabitants in this town; and, it was found to be 107,224. In order to be more certain, a *second* account was taken the same year; and the number found the same within 200. In 1755, the inhabitants were increased to 126,661. Their number, therefore, in 1758, could scarcely be less than 134,000; and must have been to the annual burials nearly as $26\frac{1}{2}$ to 1. This proportion is higher than could be expected in a town so considerable; and also so much crowded, as to have, at an average, 16 inhabitants in every house. But an observation already made, must be here remembered. Berlin, for many years, had been increasing very fast, by a conflux of people from the surrounding country and provinces. About the year 1700, the medium of annual burials was no more than 1000. In 50 years, therefore, it has more than quadrupled itself. In a city increasing with such rapidity, the *ratio* of inhabitants to the annual deaths, must be greatly above the just standard.—Were there now such accessions to London of deserters from the country, in the beginning of mature life, as would cause the number of inhabitants to increase at the rate of 10,000 every year, it would in 50 years be doubled; and the proportion of inhabitants to deaths would rise gradually, till it came to be about one-third greater. Berlin, we have seen, has, in fact, increased at *double* this rate; and, therefore, the number of inhabitants dying annually in it is in reality very high.

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[a] Vid. Police of *France*, p. 130.

I find, in a Book entitled, *Recherches sur la Population des Generalites d'Auvergne, de Lyon, de Rouen,* &c. by M. MESSANCE, and printed at *Paris* in 1766, the number of houses at *Paris* is given 23,565, from a capitation tax in 1755; and the number of families 71,114. There must, I suppose, be some deficiencies in this account; but M. *Messance*, by allowing most extravagantly (See the Table at the end of this Postcript) 8 to a family, infers from it that the number of inhabitants at *Paris* is 568,912.—On very unsatisfactory grounds also he makes the inhabitants of FRANCE to be near 24 millions. *Susmilch* calls them 16 millions. But the returns mentioned in the note, p. 44, determine them to be a much larger number, and leave little room for controversy on this subject.

The ingenious *Susmilch*, to whose works I owe

I owe my information concerning BERLIN, makes the proportion of people who die annually in *great* towns, to be from $\frac{1}{24}$ to $\frac{1}{28}$; in *moderate* towns, from $\frac{1}{28}$ to $\frac{1}{32}$; and in the country from $\frac{1}{40}$ to $\frac{1}{50}$. The observations and facts in this Essay, joined to those which will be found in the second Essay, and the *Supplement* in this volume, prove, I think, that these proportions may be more truly stated as follows. *Great* towns, from $\frac{1}{19}$ or $\frac{1}{20}$ to $\frac{1}{23}$ or $\frac{1}{24}$. *Moderate* towns, from $\frac{1}{23}$ to $\frac{1}{28}$. The *country,* from $\frac{1}{35}$ or $\frac{1}{40}$, to $\frac{1}{50}$ or $\frac{1}{60}$. This, however, must be understood with exceptions. There may be *moderate* towns so ill situated, or whose inhabitants may be so crowded together, as to render the proportion of deaths in them greater than in the largest towns: And, of this, EDINBURGH, if it is not now, was 30 years ago an example. There may be also *great* towns in which, from a sudden increase, this proportion may be less than in small towns: And of this I have just given an example in BERLIN. On the contrary; there may be *moderate* towns so advantageously circumstanced as to be equally healthy with many *country parishes*; and of this, *Chester* seems to be a very singular instance. See the Introduction to the Tables in this volume.—And there are some country parishes so ill situated as to be no less unhealthy than great towns; of which a marshy parish in *Switzerland,* described in a letter to Dr. *Horsley* in this volume, is an instance.

				According to the Survey in 1802.		
In Nottingham, according to a Survey in Sept. 1779, exclusive of 294 in hospitals and work-houses	Houses, 3267 Families, 3556	Inhabts. 17,417	To a house, 5$\frac{1}{3}$ To a family, 4$\frac{4}{5}$	Houses, 4977 Families, 6707	Inhabts. 28,861	To a house, 5$\frac{4}{5}$ To a family, 4$\frac{1}{3}$
Norwich, according to a Survey in 1752	Families, 7139	36,169	To a family, 5	Families, 9093	36,832	To a family, 4
Shrewsbury, by a Survey in 1750	3078	13,928	4$\frac{1}{2}$	3300	14,739	4$\frac{1}{2}$
Northampton, by a Survey in 1746	1083	5,136	4$\frac{3}{4}$	1652	7,090	4$\frac{1}{4}$
The parish of Ackworth, Yorkshire, in 1767	184	728	4	245	1432	5$\frac{5}{6}$
Newbury, Berkshire, in 1768	930	3792	4	971	4275	4$\frac{2}{5}$
Aldwinckle, Northamptonshire, in 1772	96	402	4$\frac{1}{5}$	86	340	4
The parish of Holy Cross, Shropshire, in 1760	242	1050	4$\frac{1}{3}$	288	1,200	4$\frac{1}{6}$
Altringham, Cheshire, in 1772	248	1029	4$\frac{1}{7}$	346	1,692	4$\frac{9}{10}$
Birmingham, in 1770	6025	30,804	5$\frac{1}{9}$	15,303	73,670	4$\frac{4}{5}$
Liverpool,* in 1773, including 400 in the poor-house, but exclusive of about 4000 absent at sea	Houses, 6340 Families, 8002	34,407	To a house, 5$\frac{2}{5}$ To a family, 4$\frac{3}{10}$	Houses, 11,446 Families, 16,969	77,653	To a house, 6$\frac{4}{5}$ To a family, 4$\frac{4}{7}$
Biddulph, in Staffordshire, according to an accurate enumeration in April 1779, by the Rev. Mr. Wilson	207	1035	5	237	1,180	5
Swinderby, in Lincolnshire, according to an enumeration by the Rev. Dr. Disney	52	224	4$\frac{1}{3}$	50	254	5
Manchester and Salford, in 1773	Families, 6416 Houses, 4338	Inhabts. 27,246	To a family, 4$\frac{2}{7}$ To a house, 6$\frac{1}{4}$	Families, 18,560 Houses, 12,547	Inhabts. 84,020	To a family, 4$\frac{1}{2}$ To a house, 6$\frac{2}{3}$
Leeds, in 1775	Families, 4096	17,121	To a family, 4$\frac{1}{5}$	Families, 11,790	53,162	To a family, 4$\frac{1}{2}$
Chester, in 1774	3428	14,713	4$\frac{3}{10}$	3427	15,052	4$\frac{2}{5}$
Calne, Wiltshire	776	3467	4$\frac{1}{2}$	852	3767	4$\frac{2}{5}$

* Houses in Liverpool in 1753 3700
Annual average of deaths for 5 years to 1771, 1291
of births 1398
See an Essay towards the History of Liverpool, by Dr. Enfield, p. 23 to 34.

Bolton, in Lancashire, in 1773, including Little Bolton	Houses,	1172	——	5339	To a house, 4½	Houses,	3386	——	17,416	To a house, $5\frac{1}{7}$
Bury, in Lancashire, in 1770	——	463	——	2090	—— 4½	——	1341	——	7072	—— 5¼
Chippenham, in Wiltshire, in 1773	——	483	——	2407	—— 5	——	667	——	3366	—— 5
Bremhill, near Calne, in Wiltshire	——	218	——	1206	—— 5½	——	259	——	1303	—— 5
Town and parish of Wycombe, Bucks	Families,	500	——	2461	To a family, $4\frac{9}{10}$	Families,	565	——	2349	To a family, 4⅙
Worsley, Parton, Pendleton, Pendlebury, and Clifton, Lancashire, in 1778	——	1685	——	9117	—— 5⅖	——	1816	——	10,270	—— 5⅗
Warrington, and its vicinity, by a Survey in April 1781	Houses,	2145	——	9770	To a house, 4⅗	Houses *,	2256	——	10,567	To a house, 4⅔
Maidstone, by a Survey in 1781	Houses, 1106 Families, 1276		——	5650	To a house, $5\frac{1}{10}$ To a family, 4⅖	Houses, Families,	1330 1742	——	8027	To a house, 6 To a family, 4⅗
Town and parish of Ashton under-Line, near Manchester, by a Survey in 1775. See Phil. Trans. Vol. 66, p. 164	Houses, 1494 Families, 1570		——	7956	To a house, 5⅓ To a family, $5\frac{1}{17}$	Houses, Families,	2891 2983	——	15,632	To a house, 5⅖ To a family, 5¼
Tattenhall and Waverton, two parishes, near Chester, by a Survey in 1774. Ibid. p. 165	Houses, 261 Families, 292		——	1413	To a house, 5⅖ To a family, 4⅘	Houses, Families,	187 188	——	852	To a house, $4\frac{4}{7}$ To a family, $4\frac{4}{7}$
Swindon, Wilts, by a Survey in 1781	Houses,	190	——	1064	To a house, 5⅗	Houses,	244	——	1198	To a house, $4\frac{9}{10}$
Parish of St. Michael's, in Chester, by a Survey in 1772	Families, 151 Houses, 127		——	618	To a family, $4\frac{1}{10}$ To a house, 4⅚	Families, Houses,	152 120	——	725	To a family, 4⅘ To a house, 6

* In the *town* of Warrington.

Speen, adjoining to Newbury, in 1768 ..	Families,	303	Inhabts.	1900	To a family, 4
The town and parish of Bala, in North Wales, in 1774	———	401	———	1723	——— $4\frac{3}{10}$
Fifty-nine Dutch villages mentioned by Struyk	———	12,005	———	45,888	——— $3\frac{5}{6}$
Holbec, Hunslett, and six other villages near *Leeds*. See Mr. Wales's Inquiry, p. 41	———	2631	———	11,468	——— $4\frac{1}{3}$
The District of Vaud, in Switzerland....	———	25,778	———	112,951	——— $4\frac{1}{3}$
Rome, in 1770	———	37,449	———	158,442	——— $4\frac{1}{4}$
The Island of Sicily, (See the end of the 2d Vol. of Brydone's Travels)	Houses,	268,120	———	1,123,163	To a house, $4\frac{1}{5}$
In fourteen market towns mentioned by Dr. Short in his Comparative History, page 58	Families,	20,371	———	97,611	To a family, $4\frac{3}{4}$
Sixty-five country parishes. Ibid	———	17,208	———	76,284	——— $4\frac{2}{5}$
The parish of Skelton, Yorkshire, in 1777	Houses,	139	———	506	To a house, $4\frac{1}{2}$
Parish of St. Cuthbert, Edinburgh, in 1743. (See Maitland's History of Edinburgh, page 171)	Families,	2,370	———	9731	To a family, $4\frac{1}{10}$
In a number of small towns and parishes in the Generalities of Auvergne, Lyons, and Rouen in France. (See *Recherches sur la Population*, par M. Messance, pages 8, 26, and 62	———	24,931	———	99,332	——— $4\frac{1}{10}$
Parish of Manchester, exclusive of the town, in 1774	Houses, Families,	2412 2525	———	13,786	To a house, $5\frac{7}{10}$ To a family, $5\frac{1}{2}$
Parish in the city of London. (See Philosophical Transactions, Vol. xlviii. Part ii. page 796	———		———		To a house, 6
Bridgend, in Glamorganshire	Houses,	205	———	824	To a house, 4

NOTE. The additional columns in the preceding page are taken from a Survey made in pursuance of an Act of Parliament passed in the year 1802, "for taking an account of the Population of *Great Britain*, and the increase or diminution thereof."—If this Survey be accurate, the number of inhabitants must have increased very considerably since the time in which the enumerations were given by Dr. *Price*: The proportions, however, of inhabitants to the *families* at least, (which is one of the principal facts intended to be proved in these statements) are nearly the same in both accounts.

M.

ESSAY II.

Observations on the proper Method of constructing Tables for determining the Rate of human Mortality, the Number of Inhabitants, and the Values of Lives in any Town or District, from Bills of Mortality in which are given, the Numbers dying annually at all Ages.

IN every place that just supports itself in the number of its inhabitants, without any recruits from other places; or where, for a course of years, there has been no increase or decrease, the number of persons dying every year at any particular age, and above it, must be equal to the number of the living at that age.—The number, for example, dying every year, at all ages, from the *beginning* to the utmost *extremity* of life, must, in such a situation, be just equal to the whole number *born* every year. And for the same reason, the number dying every year at *one* year of age and upwards; at *two* years of age and upwards; at *three* and upwards, and so on; must be equal to the numbers that reach to those ages every year; or, which is the same, to the numbers of the living at those ages. It is obvious, that unless this happens, the number of inhabitants cannot remain the same. If the former number is greater than the latter, the inhabitants must decrease; if less, they must increase. From this observation it follows, that in a town or country where there is no increase or decrease, bills of mortality which give the ages at which all die, will shew the exact number of inhabitants; and also the exact law, according to which human life wastes in that town or country.

In order to find the number of inhabitants; the mean numbers dying annually, at every particular age and upwards, must be taken as given by the bills, and placed under one another in the order of the second column of the 5th, 8th, &c. Tables in this volume. These numbers will, it has appeared, be the numbers of the living at 0, 1, 2, 3, &c. years of age; and, consequently, the sum, diminished by half the numbers living at age 0, or by half the number born annually[a], will be the whole number of inhabitants.

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[a] This subtraction is necessary for the following reason.—In a Table formed in the manner here directed, it is supposed, that the numbers in the second column are all living together at the beginning of every year. Thus; the number in the *second* column opposite to 0 in the *first* column, the Table supposes to be all just born together on the first day of the year. The number, likewise, opposite to 1, it supposes to attain to one year of age just at the same time that the former number is born. And

habitants. In such a series of numbers, the excess of each number above that which immediately follows it, will be the number dying every year, out of the particular number alive at the beginning of the year; and these excesses set down regularly, as in the third column of the Tables to which I have referred, will shew the different rates at which human life wastes through all its different periods, and the different probabilities of life at all particular ages.

It must be remembered, that what has been now said goes on the supposition that the place, whose bills of mortality are given, supports itself, by procreation only, in the number of its inhabitants. In towns this very seldom happens, on account of the luxury and debauchery which generally prevail in them. They are, therefore, commonly kept up by a constant accession of strangers or *settlers*, who remove to them from country parishes and villages. In these circumstances,

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And the like is true of every number in the second column.—During the course of the year, as many will die at all ages as were born at the beginning of the year; and, consequently, there will be an excess of the number alive at the beginning of the year, above the number alive at the end of the year, equal to the whole number of the annual births; and the true number constantly alive together, is the arithmetical mean between these two numbers; or, agreeably to the rule I have given, the *sum* of the numbers in the second column of the Table, lessened by *half* the number of annual births. See Essay I. page 9, &c.

stances, in order to find the true number of inhabitants, and probabilities of the duration of life, from bills of mortality containing an account of the ages at which all die; it is necessary that the proportion of the annual births to the annual settlers should be known; and also the period of life at which the latter remove.—Both these particulars may be discovered by the following method.

If for a course of years there has been no sensible increase or decrease in a place, the number of annual settlers will be equal to the excess of the annual burials above the annual births. If there is an *increase*, it will be *greater* than this excess. If there is a *decrease*, it will be *less*.

The period of life at which these settlers remove, will appear in the Bills by an increase in the number of deaths at that period and beyond it. Thus; in the *London* Bills, the number of deaths, between 20 and 30, is generally above double, and between 30 and 40, near triple the number of deaths between 10 and 20: And the true account of this is, that from the age of 18 or 20 to 35 or 40, there is a confluence of people every year to *London* from the country, which occasions a great increase in the number of inhabitants at these ages; and, consequently, raises the deaths for all ages *above* 20 considerably above their due proportion, when compared with the number of deaths *before* 20. This is observable in all the bills of mortality for towns with which I am acquainted, not excepting even the *Breslaw* Bills. Dr. *Halley* takes notice, that these Bills give the number of deaths between 10 and 20, too small. This he considered as an irregularity, owing to chance: and therefore, in forming this Table of Observations, he took the liberty so far to correct it, as to render the proportion of those who die to the living in this division of life, nearly the same with the proportion which, he says, he had been *informed*[b] die annually of the young lads in *Christ-Church Hospital.* But the truth is, that this irregularity in the Bills was derived from the cause I have just assigned. During the five years for which the *Breslaw* Bills are given by Dr. *Halley*, the births did, indeed, a little exceed the burials; but, it appears, that this was the effect of some peculiar causes that happened to operate just at that time; for, during a complete century from 1633 to 1734, the annual medium of *births* was 1089[c], and of burials 1256[d]. This town, therefore, must have been all along kept up by a number of yearly recruits from other places, equal to about *a seventh* part of the yearly births.

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[b] See *Lowthorp's* Abridgment of the Philosophical Transactions, vol. III. p. 670.

[c] See Dr. *Short's* Comparative History, p. 63.

[d] It appears from the account in the *Philosophical Transactions* (Abridgement, vol. VII. No. 380, p. 46, &c.) that from 1717 to 1725, the annual medium of births at *Breslaw* was 1252, of burials 1507; and also, that much the greatest part of the births died under 10 years of age.

What has been now observed concerning the period of life at which people remove from the country to settle in towns, would appear sufficiently probable, were there no such evidence for it as I have mentioned; for it might be well reckoned, that these people in general, must be single persons in the beginning of mature life, who not having yet obtained settlements in the places where they were born, migrate to towns in quest of employments.

Having premised these Observations, I shall next endeavour to explain distinctly, the effect which these accessions to towns must have, on Tables of Observation formed from their bills of mortality. This is a subject proper to be insisted on, because mistakes have been committed about it; and because also the discussion of it is necessary to shew, how near to truth the values of lives come as deduced from such Tables.

The following general rule may be given on this subject.

If a place has, for a course of years, been maintained in a state nearly stationary, as to

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age. From a Table in *Susmilch's* works, Vol. I. p. 38, it appears, that, in reality, the greater part of all that die in this town are children under five years of age.

number of inhabitants, by supplies or recruits coming in every year, to prevent the decrease that would arise from the excess of the burials above the births; a Table formed on the principle, "that the number dying annually, after "every particular age, is equal to the number living at that age," will give the number of inhabitants and the probabilities of life, too *great* for all ages preceding that at which the supplies cease; and after this, it will give them *right*. If the accessions are so great as to cause an *increase* in the place, such a Table will give the number of inhabitants and the probabilities of life, too *little*, after the age at which the accessions cease;[*] and too great, if there is a decrease. *Before* that age it will in *both* cases give them too great; but most considerably so in the former case, or when there is an increase.

For example. Let us suppose, that 244 of those born in a town, attain annually to 20 years of age; and that 250 more, all likewise 20 years of age, come into it annually from other places; in consequence of which, it has for a course of years, been just maintained in the number of its inhabitants, without any sensible increase or decrease. In these circumstances the number of the living in the town of the age of 20, will be always 244 *natives* and 250 *settlers*, or 494 in all; and, since these are supposed all to die in the town, and no more recruits are supposed to come in; 494 will be likewise the number dying annually at 20 and upwards. In the same manner, it will appear on these suppositions, that the number of the living, at every age, subsequent to 20, will be equal to the number dying annually at that age and above it; and consequently, that the number of inhabitants and the decrements of life, for every such age, will be given exactly by the Table I have supposed. But for all ages *before* 20, they will be given much too great. For let 280 of all born in the town, reach 10. In this case 280 will be the true number of the living in the town, at the age of 10; and the recruits not coming in till 20, the number given by the Bills, as dying between 10 and 20, will be the true number dying annually of the living in this division of life. Let this number be 36; and it will follow, that the Table ought to make the numbers of the living at the ages between 10, and 20, a series of decreasing means between

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[*] Agreeably to these Observations; if a place increases, not in consequence of accessions from other places, but of a constant excess of the births above the deaths; a Table, constructed on the principle I have mentioned, will give the probabilities of life too low through the whole extent of life; because, in such circumstances, the number of *deaths* in the *first* stages of life must be too great, in comparison of the number of deaths in the *latter* stages; and more or less so, as the *increase* is more or less rapid. The contrary, in all respects, takes place where there is a decrease, arising from the excess of the *deaths* above the *births*.

280 and (280 diminished by 36, or) 244. But in forming the Table on the principle I have mentioned, 250 (the number above 20 dying annually in the town who were not born in it) will be added to each number in this series; and, therefore, the Table will give the numbers of the living, and the probabilities of life in this division of life, almost twice as great as they really are. This observation, it is manifest, may be applied to *all* the ages under 20.

It is necessary to add, that such a Table will give the number of inhabitants, and the probabilities of life, equally wrong before 20, whether the recruits all come in at 20, agreeably to the supposition just made, or only *begin* then to come in. In this last case, the Table will give the number of inhabitants, and probabilities of life, too great throughout the whole extent of life, if the recruits come in at all ages above 20. But if they cease at any particular age, it will give them right only from that age; and before, it will err all along on the side of excess; but less considerably between 20 and that age, than before 20——For example. If, of the 250 I have supposed to come in at 20, only 150 then come in, and the rest at 30; the numbers of the living will be given 100 too high at every age between 20 and 30; but as just shewn, they will be given 250 too high at every age before 20. In general, therefore, the number of the living *at* any particular age, must be given by the supposed Table, as many too great as there are annual settlers *after* that age: And, if these supplies come in, at all ages indiscriminately, during any certain interval of life; the number of inhabitants and the probabilities of life will be continually growing less and less wrong, the nearer any age is to the end of that interval.

These Observations prove, that Tables of Observation formed in the common way, from bills of mortality for places, where there is an excess of the burials above the births, must be erroneous, for a great part of the duration of life, in proportion to the degree of that excess. They shew likewise, at what parts of life the errors in such Tables are most considerable, and how they may be in a great measure corrected.

All this I shall exemplify and illustrate in the particular case of *London*.

The number of deaths, between the ages of 10 and 20, is always so small in the *London* Bills, that it seems certain few recruits come to *London* under 20; or at least not so many as before this age are sent out for education to schools and universities. After 20, great numbers come in till 30, and some perhaps till 40 or 50. The *London* Tables of Observation, therefore, being formed on the principle I have mentioned, cannot give the probabilities of life right till 40. Between 30 and 40 they must be a little too high; but more so between 20 and 30; and most of all so before 20. It follows also, that these Tables must give the number of inhabitants in *London* much too great.

Table XIII. in this volume, is a Table formed in the manner I have explained, from the *London* Bills for 10 years, from 1759 to 1768; and adapted to 1000 born as a *radix*. The sum of the numbers in the second column diminished by half the number born, is 25,757. According to this Table then, for every 1000 deaths in *London*, there are 25 times and ¾ that number of inhabitants; or, in other words, the expectation of a child just born is 25¾; and the inhabitants are to the annual burials, as 25¾ to 1. But it has appeared, that the numbers in the second column being given on the supposition, that all who die in *London* were born there, must be too great; and we have from hence a DEMONSTRATION, that the probabilities of the duration of life are given in the common Tables of *London* Observations, too high, for, at least, the first 30 years of life; and also, that the number of inhabitants in *London* must be *less* than 25¾, multiplied by the annual *burials*.—The common Tables, therefore, of *London* Observations, undoubtedly want to be corrected;[f] and the way of doing this, and, in general, the right method of forming genuine Tables of Observation for towns, may be learnt from the following rule.

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[f] The ingenious and accurate Mr. *Simpson* saw that it was necessary to correct the *London* Tables, and he has done

"From the sum of all that die annually, "*after* any given age, subtract the number "of annual settlers *after* that age; and the "remainder will be the number of the living "*at* the given age."

This rule can want no explication or proof, after what has been already said.

If, therefore, the number of annual settlers in a town at every age could be ascertained; a perfect Table of Observations might be formed for that town, from Bills of mortality containing an account of the ages at which all die in it. But no more can be learnt in this instance from any Bills, than the whole number of annual *settlers*, and the general division of life in which they enter. This, however, may be sufficient to enable us to form Tables that shall be tolerably exact.—For instance. Suppose the *annual deaths* in a town which has not increased or decreased, to have been for many years, in the proportion of 4 to 3 to the *annual births*. It will hence follow, that ¼ of the persons who die in such a town are *supplies*, or *emigrants* from other places; and

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done it with great judgment; but, I think, too imperfectly, and without going upon any fixed principles, or shewing particularly, how Tables of Observation ought to be formed, and how far in different circumstances, and at different ages, they are to be depended on.

not *natives:* And the sudden increase in the deaths after 20, will also shew, agreeably to what was before observed, that they enter after this age. In forming therefore a Table for such a town, a *quarter* of all that die at all ages throughout the whole extent of life, must be deducted from the sum of all that die after every given age before 20; and the remainder will be the true number living at that given age. And if, at 20, and every age above it, this deduction is omitted, or the number of the living at every such age is taken the same with the sum of all that die after it, the result will be (supposing *most* of the supplies to come in before 30, and *all* before 40) a Table exact till 20; too high between 20 and 30; but nearly right for some years before 40; and after 40 exact again. Such a Table, it is evident, will be the same with the Table last described at all ages above 20; and different from it only under 20. It is evident also that, on account of its giving the probabilities of the duration of life too great for some years, after 20, the number of inhabitants deduced from it may be depended on as greater than the truth; and more or less so as the annual recruits enter in general later or sooner after 20.

Let us now consider, what the result of these remarks will be, when applied particularly to the *London* Bills.

It must be here first observed, that at least one *quarter* of all that die in *London* are *emigrants* from the country, and not *natives*.—The medium of annual burials for 10 years, from 1759 to 1768, was 22,956; of births 15,710. The excess is 7246; or near a *third* of the burials. The same excess, during ten years, before 1750, was 10,500; or near *half* the burials. *London* was then *decreasing*. For 12 or 15 years before 1769 it was *increasing*. This excess, therefore, agreeably to the foregoing observations, was then *greater* than the number of annual recruits; and it is now *less*. I have chosen, however, to suppose the number of annual recruits to be now[g] no more than a *quarter* of the annual burials, in order to allow for more omissions in the births than the burials; and also, in order to be more sure of obtaining results that shall not exceed the truth.

Of every thousand then who die in *London*, only 750 are *natives*, and 250 are *settlers* who come to it after 18 or 20 years of age: And, consequently, in order to obtain from the Bills a more correct Table than the 13th in this volume, 250 must be subtracted from every one of the numbers in the second column till 20; and the numbers in the third column must be kept the same, the

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[g] It must not be forgotten that this refers to the time of the first publication of this work; that is, the year 1769.

Bills always giving these right. After 20, the Table is to be continued unaltered; and the result will be, a Table which will give the numbers of the living at all ages in *London* much nearer the truth, but still too high. Such is the 14th Table in this volume. The sum of all the numbers in the second column of this Table, diminished by 500, is 20,750. For every 1000 deaths, therefore, in *London*, there are, according to this Table, 20,750 living persons in it; or for every single death, $20\frac{3}{4}$ inhabitants. It was before shewn, that the number of inhabitants in *London* could not be as great as $25\frac{3}{4}$ times the deaths. It now appears, (since the numbers in the second column of this Table are too high) that the number of inhabitants in *London* cannot be so great as even $20\frac{3}{4}$ times the deaths. And this is a conclusion which, I believe, every one who will bestow due attention on what has been said, will find himself forced to receive. It will not be amiss, however, to confirm it by the following fact, the knowledge of which I owe to the particular enquiry and kind information of Mr. *Harris*, the ingenious master of the Royal Mathematical School in Christ-Church Hospital. The average number of lads in this school has, for 30 years ending in 1768, been 831.[*] They are admitted at all ages between seven and eleven; and few stay beyond 16. They are, therefore, in general, lads between the ages of eight and 16. They have better accommodations than it can be supposed children commonly have; and about 300 of them have the particular advantage of being educated in the country. In such circumstances it may be well reckoned that the proportion of children dying annually, must be less than the general proportion of children dying annually at the same ages in *London*[h]. The fact is, that, for the last 30 years, $11\frac{4}{5}$ have died annually; or *one* in $70\frac{2}{3}$.

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[h] Mr. *Wales*, the present master of this school, has, in his Enquiry, &c. p. 33, confirmed this account; adding, that the number of children in it for *twenty* years ending in 1780, had been 851, and the average of annual deaths $10\frac{1}{4}$, or one in 83; but that the number of children for *ten* years (ending in 1780) had been 894, and the average of annual deaths only $8\frac{9}{10}$, or about one in $100\frac{1}{4}$.—— From hence Mr. *Wales* infers a great improvement in the state of *London* with respect to healthiness. But this fact is by no means a sufficient foundation for such a conclusion. In numbers so inconsiderable, an average of ten years cannot be depended on. Were it, however, the true average, the reasons above given have a tendency to prove, notwithstanding the centrical situation of this school, that it must be too low for *London* in general. If so many as *three-fourths* of all that die in *London* are natives, the proportion dying annually between 8 and 16 must be as high as *one in seventy-five*; and possibly this is even now less than the true proportion. But it would be unreasonable to take it less than the first proportion mentioned by Mr. *Wales*, or one in 83. The consequence however of stating it at even one in 90, and also one in a hundred, will be shewn in the next note; from which it will appear to be be impossible, without exceeding all the bounds of credibility, to make the expectation of a child just born in *London* much more than twenty years. See 1st Essay, notes p. 17, and 27.

According to Table XIV. of all who complete their 8th year in *London*, and who are living at that age and at every intermediate age till 16, one in 74 die annually. It follows, therefore, that, according to this Table, supposing the lads in *Christ-Church* School all admitted exactly at eight years of age, and none discharged before they have completed 16 years of age, or before they have resided eight years (suppositions much too favourable) only a 74th part ought to die annually. That Table, therefore, gives the decrements of life in *London* at these ages too little, and the numbers of the living too great: And if this is true of these ages, it must be true of all other ages *under* 20; and it follows demonstrably, in conformity to what was before shewn, that more people settle in *London* after 20, than the *quarter* I have supposed; and that from 20 to 35 or 40, the numbers of the living are given too great in proportion to the decrements of life.

In this Table the numbers in the second column are doubled at 20, agreeably to what really happens in *London*; and the sum of the numbers in this column diminished by half the whole number of deaths, gives the *expectation* of life, not of a child just born, as in other Tables, but of all the inhabitants of *London* at the time they enter it, whether that be at birth, or at 20 years of age. The *expectations*, therefore, and the *values* of *London*

don lives under 20, cannot be calculated from this Table. But it may be very easily fitted for this purpose by first finding the number of births which, according to the given decrements of life, will leave 494 alive at 20; and then adapting the intermediate numbers in such a manner to this radix, as to preserve all along the number of the living in the same proportion to the numbers of the dead. This is done in the 15th Table in this volume; and this Table may, I fancy, be recommended as better adapted to the present state of London than any other Table[*].

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[*] Had I, instead of subtracting 250 from Table XIII. before the age of 20 (agreeably to the directions in p. 36), subtracted only 200 (or supposed that only a *fifth* part of all that die annually in *London* are emigrants to it after 20), the resulting Table would have made the number dying between 8 and 16, one in 90; and the expectation at *entrance* into *London*, would have been 22, and at *birth*, 19¼.—Had 166 only been subtracted, or a 6th part of all that die in *London* supposed to be emigrants from the country, the result would have been a Table which would have made one in 100 die between 8 and 16, and the expectations just mentioned 23 and 21¼. Nor will any difference worth regarding arise, if Table XV. instead of being formed after 19 from the Bills for ten years ending at 1768, had been formed from the Bills for ten years ending in 1780. Table XVI. is such a Table; and the observations annexed to it will shew how wrong the ideas are which some have lately entertained of the improved state of *London*. Some alteration for the better there must be; but the correspondence between the Tables of Observations for whatever period they are formed from the Bills, demonstrates that it is not considerable. The great evils which produce

The values of lives, however, deduced from it, are in general nearly the same with those deduced by Mr. *Simpson*, from the *London* Bills as they stood 40 years ago. The main difference is, that after 52 and in old age, this Table gives them somewhat lower than Mr. *Simpson's* Table.

It has sufficiently appeared, what judgment we are to form of the values of lives thus deduced. During the greatest part of the interval of life, in which the annual recruits that keep up *London* come to it, these values err certainly on the side of *excess*: And it is also *probable*, that they exceed the truth in all the last stages of life[k].

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duce the unhealthfulness of towns are the closeness and foulness of the air, and the irregular modes of living. If the former of these has been diminished in *London*, the latter may have increased. But the truth may be, that the diminution of the former of these evils has not much extended itself to the lower ranks of people in *London*, who form the body of the inhabitants.

[k] When the former editions of this Treatise were published, it appeared to me probable, that, in consequence of retirements from *London* in the advanced periods of life, the Bills gave the probabilities of living in *London* after seventy years of age too *low* rather than too *high*. But I am now convinced of the contrary. Those who withdraw from *London* in advanced life are only a part of the inhabitants in the higher classes, *themselves* a small part of the whole body of inhabitants; and they withdraw, if at all, before seventy years of age, and therefore, the loss of them in the Bills can have no effect on the *proportions* of the numbers that die at all ages after seventy.—It has also occurred to me, that though the probabilities of living *before* the age of seventy, as given by the Bills, have continued remarkably the same from

1728

The number of inhabitants in *London* may also be learnt from what has been offered, more

1728 (when the ages were first included in the Bills) to 1780, (as will be shewn in the Observations on the *London* Tables in this volume), yet *after* the age of 70 there has been a gradual diminution in them; so that now, of all who die at *all* ages, only one in 44 dies at a greater age than 80; whereas at the period just mentioned, one in 32 died above this age; and of all who die above 70, only 31 in a hundred now die above 80, and 4 in 100 above 90; whereas, at the same period, 43 in a hundred used to die above 80, and 11 in a hundred above 90.

But what has principally determined my judgment in this instance is a comparison of the probabilities of living in STOCKHOLM, as deduced from the STOCKHOLM Bills, with the correct probabilities as determined by an actual account taken at three different times of the number of the inhabitants living there at all ages.—This comparison shews that Bills of mortality for great towns give the probabilities of living too high at all ages; and particularly at the *end* as well as the *beginning* of life; for the proportion of inhabitants between 70 and 80 dying annually at STOCKHOLM was, according to the *survey*, 10 out of 63; and between 80 and 90, ten out of 28; and above 90, ten out of 25; whereas, according to the *Bills*, these proportions are ten out of 100, 55, and 24 respectively.

The *London*, *Vienna*, and *Berlin* Bills give the probabilities of living between 70 and 80, and between 80 and 90, nearly the same with these, as may be learnt from the Tables of Observations for these towns in this volume; and as at *Stockholm*, they are certainly too high; the reasonable conclusion is, that they are so likewise in the other towns: The truth, perhaps, may be, that more persons (invited by the conveniencies in towns) remove into them in old age, than withdraw from them.

No one, probably, will think that the change which I have mentioned in the *London* Bills can be owing to a growing unfavourableness of *London* to the health of old people.

more nearly than by any method which has been hitherto taken. It cannot, it has been shewn, exceed $20\frac{1}{4}$ times the number of annual deaths. Could, therefore, the annual deaths be ascertained, we should know the number of inhabitants within pretty narrow limits. But the omissions in the Bills are such, that it is not possible to ascertain, with exactness, the annual deaths. Dr. *Brakenridge* supposed these omissions to amount to 2900 annually. The result of a very minute enquiry by Mr. *Maitland* is, that in the year 1729, they amounted to 3038. But they are probably now more considerable than they ever were[1]. Let them be 6000; and the

people. The following observations will sufficiently account for this fact.

LONDON, after the loss of a quarter of its inhabitants by the plague in 1665, and the devastation of the fire in 1666, recovered so fast as in three or four years to become more populous than it had ever been; and it continued to increase till the *Revolution* in 1688; after which period, and during the reigns of King *William* and Queen *Anne*, it seems, if we may judge from the Bills, to have stagnated and declined. There must, therefore, for some years after 1666, have been a very extraordinary influx of people to it; and they must have been, for the most part, people in the beginning of mature life, who would not all die off in less than 60 or 70 years, and, therefore, would, about the year 1728, render *London* fuller of inhabitants turned of 80 and 90, than it could be at any other period.

[1] Vid. Preface to a Collection of the Bills of Mortality from 1657 to 1758, p. 4, &c.—Since the above was written, the burials, as given in the Bills, have fallen from 22,688 (the annual average for five years to 1770) to

the number of inhabitants (supposing the burials 29,000) will be 601,750 at most.

All the preceding Observations are, it is plain, applicable to Bills of mortality for towns in general; and point out the way of deducing them from genuine Tables of Observations, which shall give the true probabilities and values of lives, and the true number of inhabitants, in the towns whose Bills are given.—I shall beg leave to confirm and illustrate this, in the particular case of the town of NORTHAMPTON.

In this town, containing four parishes, namely, *All-Saints*, *St. Sepulchre's*, *St. Giles*, and *St. Peter's*, an account has been kept ever since the year 1741, of the number of males and females that have been christened and buried (Dissenters included) in the whole town. And in the parish of *All-Saints*, containing the greatest part of the town, an account has been kept ever since 1735, of the ages at which all have died there.

In 1746, an account was taken of the number of *houses*, and of *inhabitants* in the town. The number of *houses* was found to

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to 20,748, the same average to 1780. Adding 6000 to this last number, and multiplying the total by $20\frac{3}{4}$, will make the number of inhabitants in *London* in 1780 554,917. But even this computation is too high, as appears from the note in p. 31.

Since 1780, the causes mentioned in the note, p. 24, and at the conclusion of the Postscript in this volume, have sunk the registered burials in *London* to 19,494, which was the average for three years to 1790.

be 1088; and the number of *inhabitants* 5136.—In the parishes of *All-Saints* and *St. Giles*, the number of *male* and *female heads* of families, *servants*, *lodgers*, and *children*, were particularly distinguished.—The *heads of families* were, 707 males; and 846 females.—*Children*, males 624; females 759.—*Servants*, males 203; females 280.—*Lodgers*, males 137; females 287.—In *St. Peter's*, males 99: females 129.——In *St. Sepulchre's*, *adults* 638; *children* 427. In the last parish the sexes were not distinguished.

The *Christenings* and *Burials* in the *whole town* for 40 years, from 1741 to 1780, have been as follows:

Christened	Males 3218	Fem. 3108	**6326—Annual medium 158.**
Buried	Males 3757	Fem. 3823	7580--Annual medium 189½.

In the parish of *All-Saints*, from 1735 to 1780, or 46 years,

Christened	Males 2152	Fem. 2068	4220--Annual medium 91¾.
Buried	Males 2877	Fem. 2312	4689--Annual medium 102.

Of these died,

Under 2 years of age —	1529
Between 2 and 5 —	362
Between 5 and 10 —	201
Between 10 and 20 —	189
Between 20 and 30 —	373

Between

Between 30 and 40	—	329
Between 40 and 50	—	365
Between 50 and 60	—	384
Between 60 and 70	—	378
Between 70 and 80	—	358
Between 80 and 90	—	199
Between 90 and 100	—	22
	Total	4689

A Table formed from these *data* in the manner of Table XIII. in this volume; or, on the supposition, that all who *die* in *Northampton* were *born* there, would give the expectation of a child just born 28.83 years; and consequently the proportion of the inhabitants to the annual deaths, as 28.83 to 1. It has been shewn, that this proportion, in a place where the burials exceed the births, must be *greater* than the *true* proportion of the number of inhabitants to the annual deaths: And this appears to be the real case. For the Bills shew, that, from 1741 to 1750, or for 10 years, about the time when the number of inhabitants was 5136, the annual medium of burials was 197.5; which, multiplied by 28.83, gives 5694; or a 9th part more than the *true* number[m].

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[m] According to the Survey in 1802, the number of inhabitants in *Northampton* appears to have been 7020, or 1884 more than it was in 1746. But the *burials* have uniformly

A Table formed in the manner of Table XIV. in this volume, would give the proportion of inhabitants to the annual deaths, as 26.41 to 1; and this makes the inhabitants 5216, or very nearly the true number.

The XVII. Table, in this volume, is formed in the same manner with Table XV. for *London*: And this is the genuine Table of Observations for *Northampton*[n], from which

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uniformly exceeded the *births* in a very considerable proportion, and therefore, if the account in the above Survey be correct, this increase can have proceeded only from *migration*. M.

[n] In the fourth edition of this Treatise the following corrections were made in this Table. First. The Table printed in the first three editions having been formed from the *Northampton* Bills for 36 years, this Table was rendered a little more correct in consequence of being formed from the same Bills for 46 years.—Secondly. The Bills give the numbers dying annually between 20 and 30 greater than between 30 and 40; but this being a circumstance which does nor exist in any other register of mortality, and undoubtedly owing to some accidental and local causes, (*) the decrements were made equal between 22 and 40; preserving, however, the total of deaths between 20 and 40 the same that the Bills give them.—Thirdly. The Bills giving only the totals of deaths under two years of age, and between 2 and 5, the proportions of deaths for every particular year between 2 and 5, and for every *quarter* of a year after birth till one year of age, were made the same nearly that the Chester register makes them. See the Introduction to the collection of Tables in this volume.

(*) This is most probably owing to the migration of persons into the town between the ages of 20 and 30. See the note in the preceding page. M.

which may be calculated the true probabilities and values of lives in that town.

At NORWICH, Bills of Mortality, of the same kind with those in *London* and *Northampton*, have been kept for many years. I have been favoured with a copy of these Bills for 30 years, from 1740 to 1769. The annual medium of *christenings*, during this period, has been 1057[°], of *burials* 1206. And from hence, together with the account of the numbers dying in the several decades of life, after 10, I have formed Table VIII. which shews the true probabilities of the duration of life in this town.

In consequence of these alterations, and also of increasing the *radix* from 1165 to 11650, in order to adjust the decrements with greater regularity and precision, this Table, in my opinion, gives the *mean* probabilities and values of lives at every age with more accuracy than any other Table now extant.

[°] In this register all that die before baptism, and also all that are born and die among *Quakers*, *Jews*, &c. are omitted. There are also some other omissions; and the true annual medium of births and burials must be greater than they are given in the bills. But this will have no effect on a Table of Observations, supposing the *proportions* of the births to the burials, and of the numbers dying in the different stages of life, given right.—It is proper I should mention further here, that these Bills give only the whole number of children dying under 10, without specifying the numbers dying under two years of age, between 2 and 5, and between 5 and 10, as in other Bills. I have, therefore, in forming the Table for NORWICH, supposed the proportions of these numbers the same that I have given them for NORTHAMPTON.

The following particulars seem to deserve notice here.

First. Had these Tables been formed from the NORTHAMPTON and NORWICH Bills, for no longer time than any 10 years taken together, of the periods I have mentioned; they would not have given the values of lives materially different. These Tables, therefore, are founded on a sufficient number of Observations; and it appears, that there is an invariable law which governs the waste of human life in these towns.—The same remark might be made concerning LONDON[p].

Secondly. An account was taken at

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[p] Some have entertained a very wrong notion of the imperfections in the LONDON Bills. They do, indeed, give the *whole* number of births and deaths much too little; but the conclusions with respect to the probabilities of life in LONDON, and the proportion of inhabitants dying annually, depend only on the *proportions* of the numbers dying in the several divisions of life; and these are given *right* in the LONDON Bills.—For first, There seems nothing in this case, that can be likely to cause the deficiencies in the Bills to fall in one division of life more than in another: But what decides this point is, that these proportions, as given by the Bills for *any* ten, or even *five* years, come out nearly the same with one another; and always very different from the proportions given by other Bills.—There are no other variations, than such as must arise from the fluctuations of LONDON as to increase and decrease; and also from some improvements in its state, which have lately taken place, and particularly the law lately passed, ordering all parish infants to be nursed in the country. See the note in page 24; and the Observations on Table XVI. in this volume.

SHREWSBURY, in 1750, of the *whole* number of inhabitants; distinguishing, particularly, the number at the age of 21 and upwards.—The former number was 8141; and the latter, 5187. According to a Table formed for NORTHAMPTON, in the same manner with Table XIV. for LONDON, the whole number of the living is to the number of the living at 21 and upwards, as 26,411 to 16,586; that is, as 8141 to 5113. According to a like Table for NORWICH, these numbers are to one another, as 24,500 to 15,680; that is, as 8141 to 5210. These Tables, therefore, give the proportion of the *whole* number of inhabitants, to the number of the living at 21 and upwards, almost exactly the same with the true proportion, as it is at SHREWSBURY[q]: And this affords an additional proof of the rectitude of the principles on which these Tables have been formed.

But further. The number of inhabitants,

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[q] The annual medium of births at SHREWSBURY, for 7 years, from 1762 to 1768, was 301; of burials 329. It appears, therefore, that one in 24¾ of the inhabitants die annually. But it should be remembered, that in 1766, the small-pox and measles very much increased the mortality in this town; and I find also, that since 1750, a nursery for *foundlings* from LONDON was established here; and that in 1768 this nursery contained 660 children and servants. It seems, therefore, probable that the true *medium* of burials about the year 1750, must have been less than 329; and that the proportion of inhabitants dying annually, may not be much greater than it is at NORTHAMPTON; or 1 in 26.41.

not reckoning children, in the parishes of *St. Giles* and *All-Saints*, NORTHAMPTON, was, in 1746, 2460; and the *whole* number of inhabitants in these two *parishes* was 3843. See p. 95. In the account I have received, the particular age at which the limit of childhood was fixed in taking this survey, is not mentioned; but there seems reason to believe, that it was 21: And, taking this for granted, the number of inhabitants, not children, will come out (by such a Table for NORTHAMPTON as Table XIV. for LONDON) 2414; or, nearly the same with the number *really* found in these parishes. Had this number been computed, from a Table formed for NORTHAMPTON, in the manner of Table XIII. in this volume, it would have come out only 2176. This remark is applicable to the Table for *Breslaw*, formed by Dr. *Halley*, compared with the same Table, corrected for all the ages under 20[r], by the rule, p. 84. The necessity, therefore, of that correction is verified by facts; and it appears, abundantly, that the Tables I have given for NORTHAMPTON and NORWICH may be depended on.

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[r] I have given Dr. *Halley's* Table in this volume just as he framed it. A correction of it might be made from the proportion of births to burials, mentioned p. 77. And it would then appear, that a 25th part of the inhabitants at *Breslaw* die annually; and that half the number born die there under six, as well as at *Norwich*. This Table, as we now have it, makes half live to 16; but the account mentioned in the note, page 77, shews this not to be the truth. It likewise makes the number of inhabitants at SHREWSBURY, above the age of 21, to be 4730; and in the parishes of *All-Saints* and *St. Giles*, in NORTHAMPTON, 2230. It gives, therefore, these numbers wrong; whereas, as observed above, a corrected Table would give them true.

But, thirdly. In comparing these two Tables, it may be observed, that there is a difference between them in favour of NORTHAMPTON, *fewer* dying there in childhood, and *more* in old age. The same would be found to be true, were the NORTHAMPTON Table to be compared with a corrected BRESLAW Table. It appears, therefore, agreeably to what might have been expected, that NORTHAMPTON, being a small town compared with BRESLAW and NORWICH, is less unfavourable to health and longevity. The difference, however, is not considerable. After the age of 20, there is a striking conformity between all the three Tables, which gives them great weight and authority.

Further. It ought to be noted, that these Tables prove the *decrements* of life between 25 and 75, in moderate towns, to be nearly *equal*. At NORTHAMPTON it appears that, of a given number of persons alive at 20, the same number die every year till 78, without any considerable interruption, except between the ages of 30 and 40.—A like uniform decrease in the probabilities of the duration of life appears in the BRESLAW and NORWICH Tables; but not so remarkably. It was this circumstance in the BRESLAW

LAW Table, that led Mr. *De Moivre* to the *hypothesis*, described in p. 2, Vol. I. and so often mentioned in this work. It gives the values of lives in the middle stages nearly the same that they are by these three Tables; but it is far from being applicable with sufficient correctness to the valuation of lives before 25 and after 75 years of age[a]; nor does it at all correspond to the law which governs the waste of human life in great towns, and in country parishes and villages. This will appear immediately from inspecting the Tables in this volume. I will here only compare the *expectations* of life by it with the *expectations* at the same ages in *London*, and in a country parish, where the exactest observations have been made. I mean, in the parish of HOLY-CROSS near *Shrewsbury*[t], mentioned in the first Essay, page 34.

EXPEC-

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[a] Having in the first three editions of this work given examples from this hypothesis, and the Tables founded upon it and printed in this volume, I have been obliged to continue them in this edition; but the truth is, that it does not in *any* part of life give such correct values, particularly of joint lives, as are necessary in some cases. And it is this, together with the other reasons mentioned here, and in the Postscript to the 4th Chapter, Vol. I. that has induced me to employ a good deal of time in calculating the Tables of the values of lives from real observations, which will be found in this volume.

[t] The register of this parish, with a Table of the probabilities and expectations of lives deduced from it will be given among the Tables in this volume. The expectation

EXPECTATIONS *of* LIFE *at the*

	In *London.*	By Hypothesis.	*Holy-Cross.*
Age of 10	34.8	38	46
20	28 9	33	38.66
30	23.6	28	32.66
40	19.6	23	26.40
50	16.0	18	20.40
60	12.4	13	14.86
70	8.0	8	10.00

There

pectation of a child just born here is 33.9.—At NORTHAMPTON it is 25½. At NORWICH, 23¾. In LONDON, 18.—In this parish, 1 in 11 dies at 80, and upwards. In NORTHAMPTON; 1 in 22. In NORWICH; 1 in 27. In LONDON; 1 in 60. See Essay I. p. 46.

I will add, that the probabilities of life here appear to be much the same with the probabilities of life among the ministers and professors in SCOTLAND.—This is a fact of some consequence; and, therefore, I will give a brief account of it.

The mean age at which the ministers and professors enter into benefices and professorships in *Scotland* is reckoned to be 27. Their number is 974. The establishment among them for providing for their widows begun on the 25th of *March* 1744; from which time to *November* 22, 1779, 1037 have died: That is, 29 annually; or 1 in 33⅗. The *expectation*, therefore, of a life among them, at the age of 27, is 33.6; which is nearly the same with the *expectation* of a life of the same age in the parish of *Holy-Cross*; and 3½ years more, than the *expectation* of the same age by Tables V. VIII. and XVII. in this volume.—Now the *expectation* at a given age, being composed of all the probabilities of life from that age to the extremity of life; there arises from hence reason for concluding, that the probabilities of life among the ministers in *Scotland*, cannot differ much in any part of life from those in this parish.—But there is another fact that confirms this observation.

The

There is one more fact which I shall here take notice of; and which deserves more attention than has been hitherto bestowed upon it. I mean; "the difference between the "probabilities of life among *males* and *females*, in favour of the latter."

From the account in p. 95, it appears, that at NORTHAMPTON, though more *males* are born than *females*, and nearly the same number die; yet the number of living *females* is greater than the number of *males*, in the proportion of 2301 to 1770, or 39 to 30. This cannot be accounted for without

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The annual average of weddings among the ministers and professors in SCOTLAND, for 35 years ending in 1779, has been 30. The average of married persons among them, for 17 years ending in 1757, had been 667. This number, divided by 30, gives 22, the *expectation* of marriage among them; which is above 3 years more than the expectation of marriage would be, by Dr. *Halley's* Table, on the supposition, that all marriages may be justly considered as commencing, one with another, so early as the age of 30.—The *expectation* of two equal *joint* lives is to the *expectation* of a *single* life of the same age, as 2 to 3, by note (K) at the end of the first volume. It follows, therefore, that among the ministers in *Scotland*, the *expectation* of a *single* life at 30 cannot be less than 33. Most probably it is more; on account of the later commencement of marriage in the situation of the *Scotch* ministers.—I reckon also that 27 must be less than the mean age at which they enter their benefices and professorships; meaning by it, not the age on each side of which equal numbers enter, but the age at which the excess of the interval of time taken to enter on one side, is just such as to compensate the greater numbers who enter on the other side. See the conclusion of note (F) in the first volume.

out supposing, that *males* are more short-lived than *females*.—One obvious reason of this fact is, that males are more subject to untimely deaths by accidents of various kinds; and also, in general, more addicted to the excesses and irregularities which shorten life. But this is by no means the *only* reason. For it should be observed that at NORTHAMPTON the number of *female* children was, in 1746, greater than the number of male children, in the proportion of 759 to 624.—The greater mortality of males, therefore, takes place among *children*. But this, together with the greater mortality in general of males at all ages, will more particularly appear from the following recital of facts.

In the parish of *Holy-Cross, Salop*, the ingenious Vicar, Mr. *Gorsuch*, in 1760, and again in 1770, took the number of male and female inhabitants turned of 80. In 1760, the number of females turned of this age, was 13; of males, 2. In 1770, these numbers were, females, 11; males, 6.—And for 10 years to 1770, eleven out of 365 had died between the ages of 85 and 102; and they were all females[u].

At

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[u] For 20 years, from 1760 to 1780, eleven out of 966 had died above 90 in this parish; and they were all females. See the Register of this parish to 1780; among the collection of Tables in this volume.

From an accurate survey of the parish of *Skelton*, in *Yorkshire*, At BERLIN, it appeared, from the accurate account which was taken of the inhabitants in 1747, and which has been mentioned in p. 67, that the number of *female* citizens exceeded the number of *male* citizens, in the proportion of 459 to 391: And yet, out of this smaller number of males, more had died for 20 years preceding 1751, in the proportion of 19 to 17[1].

At EDINBURGH, in 1743, the number of *females* was to the number of *males*, as 4 to 3; (See Essay I. p. 57) but the females that died annually, from 1749 to 1758, were to the males, in no higher proportion than $3\frac{1}{5}$ to 3. Before 1749, the Bills gave the totals of burials, without distinguishing them into the totals of males and females dying every year.

Mr. *Kerseboom*, in his Essay on the numbers of people in HOLLAND, informs us, that from the Tables of assignable Annuities for lives in HOLLAND, which had been kept

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Yorkshire, taken 1777, under the direction of Dr. *Bisset*, it appeared that 39 (that is, an 18th part) were 75 and upwards, 25 of whom were females, and only 14 males.

According to an enumeration in 1762, a hundred and five parishes and villages in the generality of *Rouen* in *France*, consisted of 15,943 families, and 60,552 inhabitants, 6812 of whom were girls and 5670 boys, under the age of fourteen.

[1] Vid. *Susmilch, Gottliche Ordnung*, &c. where a minute account is given of the number of males and females at BERLIN in 1747; and also, of the numbers of each sex that had died from 1722 to 1750.

there for 125 years, wherein the ages of the persons dying are truly entered; it appears, that females have, in all accidents of age, lived about 3 or 4 years longer than the same number of males. See *Philosophical Transactions* abridged, Vol. IX. p. 326.

In Volume the 7th of the *Philosophical Transactions* abridged, Part IV. p. 46. &c. there is an account of the numbers of *male* and *female* still-born children and chrysoms, and of boys and girls under 10, of married men and married women, and of widows and widowers, who died for a course of years at *Vienna, Breslaw, Dresden, Leipsic, Ratisbon*, and some other towns in GERMANY.

He that will take the pains to examine these accounts will find that, though in these towns the proportion of males and females born is no higher than 19 to 18, yet the proportion of boys and girls[y] that die is 8 to 7; and that, in particular, the *still-born* and *crysom males*, are to the still-born and *chrysom females*, as 3 to 2.

In these accounts it appears also, that of 7270 *married* persons who had died in these towns,

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[y] In the accounts from *Breslaw* it is particularly mentioned, that by *boys* and *girls* are meant children to 10 years of age, of whom for 8 years from 1717 to 1725, *seven* males died to *six* females, exclusively of the *still-born* and *chrysoms*.

towns[1], 4336 were married men, and but 2934 married *women*, that is, *three* married *men* died to two married *women*. In all POMERANIA, during 9 years, from 1748 to 1756, there died 13,556 married men, and 10,007 married women; that is, nearly 15 to 11. *Susmilch, Gottliche Ordnung*, Vol. I. Tables, p. 97. The scheme for making provision for the widows and orphans of the ministers in SCOTLAND, has obliged them to keep an account of the number of *weddings* among them, and the number of *widows* left annually; and it appears from the *reports* of the *trustees* for carrying this scheme into execution, that the annual medium of *weddings* is 30. And the annual medium of widows, who came upon the scheme for 35 years, to 1779 was $19\frac{1}{10}$. Of 30 marriages then contracted annually, $19\frac{1}{10}$ became extinct by the deaths of *husbands*; and not 11 by the deaths of *wives*. That is; among the ministers and professors in SCOTLAND, 19 married men die to 11 married women. It appears, therefore, that there is the chance of more than 7 to 4, that the *woman* shall be the survivor of a marriage and not the *man*. In order to account for this by the difference of age between men and their wives, this difference ought to be at least 13 or 14 years. That is; supposing the mean age at which women marry to be 23, the mean age at which men marry ought to be 36 or 37. But this seems to exceed the bounds of credibility; and, therefore, very probably, the greater mortality of males must operate in this case.

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[1] In *Breslaw* alone, for the eight years mentioned in the last note, 1891 married men died, to 1196 married women; that is 5 to 3.

It is further observable in the accounts from *Germany*, to which I have referred, that the number of *widows* dying annually, is four times the number of *widowers*[a]; and, as *widows* are certainly, one with another, several years younger than *widowers*; it may be concluded from hence, that the number of the former in life together could not be less than five times the latter.—This fact is likewise confirmed, by the observations which have been made among the ministers in *Scotland*. The number of *widows* in life, derived from the whole body of ministers and professors, cannot be much short of 400; but the number of widowers among them had, for many years before 1779, been scarcely 90; that is, not so much as a *quarter* of the number of *widows*. It may be easily seen, and it would not be difficult to demonstrate, that neither the greater number of persons left widows, nor any probable supposition concerning the greater frequency of marriages among widowers, can completely account for this, without admitting the *greater mortality of males*. This, therefore, appears on the whole to be a fact well established: And it follows from it, that in order to calculate the values of *Life-Annuities* and *Reversions* with exactness, there ought to be distinct Tables of the probabilities of life for *males* and *females*. All that is necessary to obtain the proper *data* for forming such Tables is, that the *sexes* as well as the *ages* of the dead should be specified in the Bills; and this improvement would be rendered more complete by distinguishing the males that die under the denomination of boys, married men, widowers and bachelors; and the females under the denominations of girls, married women, widows, and virgins[b].

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[a] In *Dresden* alone, the number of *widows* who died, in four years, was 584. The number of *widowers*, 149. That is: 4 to 1. At WITTENBERG, during 11 years, 98 *widowers* died, and 376 *widows*.—At GOTHA, during 20 years, 210 *widowers* and 760 *widows*. *Susmilch's Gottliche Ordnung*, Vol. II. p. 273 —In the country, on account of a less difference between the ages of husbands and wives and more early marriages, the deaths of *widowers* and *widows* come nearer to one another: for in POMERANIA, during the 9 years mentioned in p. 109, the *widowers* that died were 411, the *widows* 1053; or 2 to 5. —At CHESTER, during 9 years, from 1772 to 1779, the number of *widowers* who died was 157; of *widows* 390. —The number of widowers in the town in 1774 was 258; of widows 736.—At *Warrington*, during 7 years, from 1773 to 1779, seventy-nine widowers died, and 155 widows. See the introduction to the Tables in this volume.

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[b] Since the former editions of this work, Registers of mortality on the plan proposed here and in the two following pages, have been established at *Chester* under the direction of Dr. *Haygarth*; at *Warrington*, under the direction of Dr. *Aikin*; and at *Eccles* near *Manchester*, under

It has been observed, that the Author of nature has provided, that more *males* should be born than *females*, on account of the particular waste of *males*, occasioned by wars and other causes. Perhaps it might have been observed with more reason, that this provision had in view that particular weakness or delicacy in the constitution of males which makes them more subject to mortality; and which, consequently, renders it necessary that more of them should be produced, in order to preserve in the world a due proportion between the two sexes [c].

In the course of this Essay, it has often appeared, that I have been particularly indebted to an information which I have received from NORTHAMPTON. I should be inexcusable, did I not mention, that I owe

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under the direction of Dr. *Percival*.—The first two of these Registers (abstracts of which will be found in this volume) have already furnished *data* nearly sufficient for forming distinct Tables of the values of lives among males and females; and they confirm what has been here observed concerning the longer duration of human life among females. But the best information on this subject has been given by the Observations in SWEDEN, which came to my knowledge since the first three editions of this Treatise, and which have helped me not a little to improve it, as may be seen in this volume.

For more facts relating to the longer duration of life among females, see page 136 in the first volume, and the Supplement in this volume.

[c] More will be said on this subject in the *Supplement* in this volume, and the true cause of that debility in the male constitution, which shortens its duration, will be there assigned.

this information to Mr. *Lawton*, an ingenious gentleman in that town, who has preserved the Bills of Mortality there with much care, and been very obliging in communicating them to me.—It is much to be desired, that like accounts were kept in every town and parish. It would be extremely agreeable to learn from them the different rates of human mortality in different places, and the number of people and progress of population in the kingdom. The trouble of keeping them would be trifling; but the instruction derived from them[d], would be very important.—I have already proposed one improvement of such accounts. I will add, that they would be still more useful, did they give the ages of the dead after 10, within periods of *five* instead of *ten* years. During every period so short as *five* years, the decrements of life may, in constructing Tables, be safely taken to be *uniform*. But this cannot be equally depended on, in periods so long as ten years.

There is yet another improvement of these accounts, which I shall take this opportunity to mention. They should contain not only a list of the distempers of which all die, like that in the *London* Bills; but they should specify particularly the numbers dying of these distempers, in the several divisions of life. Accurate registers of mortality kept in this manner in all parts of the kingdom, and compared with records of the seasons, and of the weather, and with the particular circumstances which discriminate different situations, might contribute, more than can be easily imagined, to the increase of *physical* knowledge. But to proceed no farther in these Observations; I shall now beg leave to shut up this Essay with the following general reflection.

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[d] See Essay I. p. 53, 54.

I have represented particularly the great difference between the duration of human life in towns and in country parishes; and from the facts I have recited it appears, that the further we go from the artificial and irregular modes of living in great towns the fewer of mankind die in the *first* stages of life, and the more in its *last* stages. The lower animals (except such[e] as have been taken under human management) seem in general to enjoy the full period of existence allotted them, and to die chiefly of old age: And were any observations to be made among *savages*, perhaps the same would be found to be true of them.—DEATH is an evil to which the order of Providence has subjected every inhabitant of this earth; but to man it has been rendered unspeakably more an evil than it was designed to be. The greatest part of that black catalogue of diseases which ravage human life, is the offspring of the tenderness, the luxury, and the corruptions introduced by the vices and false refinements of civil society[f]. That delicacy which is injured by every breath of air, and that rottenness of constitution which is the effect of indolence, intemperance, and debauchery, were never intended by the Author of Nature; and it is impossible, that they should not lay the foundation of numberless sufferings, and terminate in premature and miserable deaths.—Let us then value more the simplicity and innocence of a life agreeable to nature; and learn to consider nothing as savageness but malevolence, ignorance, and wickedness. The order of nature is wise and kind. In a conformity to it conſiſt health and long life; grace, honour, virtue, and joy. But nature turned out of its way will always puniſh. *The wicked ſhall not live out half their days.* Criminal exceſſes embitter and cut ſhort our *preſent* lives; and the higheſt authority has taught us to expect, that they will not only kill the *body*, but the *ſoul*; and deprive of ETERNAL LIFE.

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[e] Calves are the only animals taken under our peculiar care immediately after birth; and in consequence of then administering to them the same sort of physic that is given to infants, and treating them in other respects in the same manner; it is probable, that more of them die soon after being born, than of *all* the other species of animals, which we see in the same circumstances. See the *Comparative View of the State and Faculties of Man with those of the Animal World*, p. 23.—It is, indeed, melancholy to think of the havock made among the human species by the unnatural *customs* as well as the *vices* which prevail in polished societies. I have no doubt, but that the custom, in particular, of committing infants, as soon as born, to the care of *foster-mothers*, destroys more lives than the sword, famine, and pestilence put together.

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[f] The ingenious and excellent writer quoted in the last note, observes, that the whole class of diseases which arise from catching cold, are found only among the civilized part of mankind, p. 51.—And, concerning that loss of all our higher powers which so often attends the decline of life, and which is so humiliating to human pride, he observes, that it exhibits a scene singular in nature, and that there is the greatest reason to believe, that it proceeds from adventitious causes, and would not take place among us if we led natural lives, p. 62.

A SUPPLEMENT[a],

CONTAINING

Additional Observations on the Duration of Human Life in different Situations; and on the Population of the Kingdom.

SINCE the first publication of this work, I have had the pleasure of reading an ingenious Memoir on the State of Population in the *Pais de Vaud*, a district of the province of *Bern* in *Switzerland*. The author of this memoir is Mr. *Muret*, the first minister at *Vevey*, a town in that district, and secretary to the Economical Society there. It forms the first part of the *Bern* Observations for the year 1766; and a good abstract of it may be found in the 69th article of a work entitled, *De Re Rustica*, or the Repository. It contains an account of many facts which appear to me curious and important; and which confirm the observations I have made in the two preceding Essays.—Some of these facts I will here recite.

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[a] This supplement was an addition to this Treatise in the Second and Third Editions of it. I have in the present Edition added to it a *Postscript*, containing a review of the arguments for and against the increasing population of the kingdom.

In the first Essay I have asserted, that there is a much greater difference between the probabilities of the duration of life in *great towns* and in *country parishes*, than is commonly suspected; and, as one proof of this, I have observed, that though in *London* the greatest part of the natives die under three years of age, in the country the greater part live to marry. Mr. *Muret's* Observations and Tables give a distinct demonstration of this, by shewing, that in the province of *Vaud*, the greater part of the inhabitants live many years beyond the age of maturity.—But to be a little more explicit.

The district of *Vaud*, in *Switzerland*, contains 112,951 inhabitants of all ages; 25,778 *families*; 38,828 married persons: and the annual medium of *births*, for 10 years before 1760, had been 8155; of *weddings*, 808; of *deaths*, 2504.—It appears, therefore, that the married are very nearly a *third* part of the inhabitants, that the number of persons to a family is $4\frac{1}{3}$; and that one in 45 of the inhabitants die annually. It may be further learnt (by dividing half the number of the married by the annual medium of weddings), that the *expectation* of marriage in this country is 23 years and $\frac{1}{2}$; and (from the proportions of the births, weddings, and deaths)[b] that the greater part of those who are born live to marry. But of this fact there is, I have just intimated, a more particular and distinct proof.—From a Table given by Mr. *Muret*, of the rate of human mortality in this country (derived from registers kept in 43 parishes, of the ages at which the inhabitants die), it appears, that one *half* of all that are born live beyond 41 years of age.—The examination of this Table will, undoubtedly, be a gratification to the reader; and, therefore, I have chosen to make it a part of these additions. See p. 123. I have also given a Table which I have formed from a register in *Susmilch's* works, of the ages at which the inhabitants of a country parish in BRANDENBURGH died, during 50 years, ended at 1759.—And I have further thought proper to add, as contrasts to these Tables, two Tables exhibiting the probabilities of life at VIENNA and BERLIN. See p. 124, 125, and 126.

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[b] See the note, p. 37, &c.

The following observations concerning these Tables should be attended to.

The Table for the country of VAUD, though it gives the probabilities of life in its first stages very high; and, at some ages, more than double to the probabilities of life in great cities; yet, certainly, gives them *too* low. For, first, it has just appeared, that in this country the births exceed considerably the deaths. The emigrations, likewise, from it are very numerous, as will be presently observed: and the necessary effect of these two causes is, to make the registers give the number of deaths in the first stages of life too great in comparison of the deaths in the last stages. A Table formed from such registers must give the probabilities of life too low, according to the observations in the Second Essay, and in the introduction to the following Collection of Tables.

After 40, the probabilities of living in this country decrease very fast; and, after 65, they appear to be rather lower than is common. Mr. *Muret* has taken notice of this fact, and ascribes it to the particular prevalency of drunkenness in his country. He had, he says, once the curiosity to examine the register of deaths in one town, and to mark those whose deaths might be imputed to drunkenness; and he found the number so great, as to incline him to believe, that hard drinking kills more of mankind, than pleurisies and fevers, and all the most malignant distempers.

The former of these observations is applicable to the Table for the country parish in *Brandenburgh*; for it appears from *Susmilch's* account[c], that the births there exceed the deaths more than in the country of Vaud; nor is it to be imagined, that there are not likewise many emigrations from it, particularly, to Berlin and the King of *Prussia's* armies.

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[c] See the remarks on Table LII. in the following collection.

From the Tables for Vienna and London, compared with the Table for Berlin, it appears, that the last of these towns, though much the smallest, has at some ages even a worse effect on the duration of life, than either of the former: And the reason, perhaps, may be, that the inhabitants there are much more crowded together. See p. 67. Between the ages of 30 and 35, and also between 42 and 52, there is an irregularity in the Berlin Table, which, very probably, would not have appeared in it, had it been formed from the bills for a longer term of years.

From the age of 25 to 45, Vienna appears, in the Tables, to be less unfavourable to life than London; but it cannot be depended upon that this is the truth, for the Vienna Table may give the probabilities of living at these ages higher, only because the recruits from the country come to it later, or in greater numbers, after 30 and 40, than in London. A like effect would also arise from a greater number of migrations in old age from London than from Vienna.

In forming the Tables for Vienna and Berlin, I have applied the correction explained in the Second Essay, and demonstrated there to be necessary; and, in making this correction, I have supposed, agreeably to the proportion of the births to the burials, that a fifth of all who die in these cities, are persons who removed to them at 20 years of age. Notwithstanding this correction, the Table for BERLIN gives the probabilities of life between 10 and 20 so high, and in such disproportion to the probabilities of life immediately after 20, as to exceed all the bounds of credibility. The true reason of this may be learnt from what has been said in p. 67, of the rapid increase of BERLIN.

TABLE I.[d]

Shewing the Probabilities of Life in the District of VAUD, SWITZERLAND, formed from the Registers of 43 Parishes, given by Mr. *Muret*, in the First Part of the BERN Memoirs for the Year 1766.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	1000	189	31	558	5	62	286	12
1	811	46	32	553	5	63	274	12
2	765	30	33	548	4	64	262	12
3	735	20	34	544	5	65	250	14
4	715	14	35	539	6	66	236	16
5	701	13	36	533	6	67	220	18
6	688	11	37	527	7	68	202	18
7	677	10	38	520	7	69	184	16
8	667	8	39	513	7	70	168	15
9	659	6	40	506	6	71	153	13
10	653	5	41	500	6	72	140	11
11	648	5	42	494	6	73	129	10
12	643	4	43	488	6	74	119	10
13	639	4	44	482	6	75	109	11
14	635	4	45	476	7	76	98	13
15	631	5	46	469	8	77	85	14
16	626	4	47	461	10	78	71	13
17	622	4	48	451	10	79	58	12
18	618	4	49	441	10	80	46	10
19	614	4	50	431	9	81	36	7
20	610	4	51	422	8	82	29	5
21	606	4	52	414	8	83	24	4
22	602	5	53	406	9	84	20	3
23	597	5	54	397	9	85	17	3
24	592	5	55	388	11	86	14	3
25	587	5	56	377	13	87	11	2
26	582	5	57	364	16	88	9	2
27	577	5	58	348	17	89	7	2
28	572	5	59	331	17	90	5	1
29	567	4	60	314	15			
30	563	5	61	299	13			

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[d] All the Bills, from which this and the following Tables are formed, give the numbers dying under 1 as well as under 2 years; and, in the numbers dying under 1 are included, in the country parish in *Brandenburgh* and at *Berlin*, all the still-borns. All the bills also give the numbers dying in every period of five years.

TABLE II.

Shewing the Probabilities of Life in a Country Pariſh in BRANDENBURGH, formed from the Bills for 50 Years, from 1710 to 1759, as given by Mr. SUSMILCH, in his *Gottliche Ordnung*, p. 43.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	1000	225	31	482	5	62	260	12
1	775	57	32	477	5	63	248	12
2	718	31	33	472	5	64	236	12
3	687	23	34	467	5	65	224	11
4	664	22	35	462	6	66	213	11
5	642	20	36	456	6	67	202	12
6	622	15	37	450	6	68	190	12
7	607	12	38	444	6	69	178	12
8	595	10	39	438	6	70	166	13
9	585	8	40	432	5	71	153	15
10	577	7	41	427	5	72	138	16
11	570	6	42	422	5	73	122	15
12	564	5	43	417	5	74	107	14
13	559	5	44	412	6	75	93	13
14	554	5	45	407	6	76	80	12
15	549	5	46	400	6	77	68	9
16	544	5	47	394	6	78	59	8
17	539	4	48	388	7	79	51	7
18	535	4	49	381	7	80	44	6
19	531	4	50	374	7	81	88	6
20	527	5	51	367	8	82	32	6
21	522	5	52	359	8	83	25	6
22	517	5	53	351	8	84	21	5
23	512	5	54	343	9	85	15	4
24	507	5	55	334	10	86	11	3
25	502	4	56	324	10	87	8	2
26	498	3	57	314	10	88	6	2
27	495	3	58	304	11	89	4	1
28	492	3	59	293	11	90	3	1
29	489	3	60	282	11	91	2	1
30	486	4	61	271	11	92	1	1

TABLE III.

Shewing the Probabilities of Life at VIENNA, formed from the Bills for Eight Years, as given by Mr. SUSMILCH, in his *Gottliche Ordnung*, page 32, Tables.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	1495	682	31	364	6	62	129	6
1	813	107	32	358	5	63	123	7
2	706	61	33	353	6	64	116	7
3	645	46	34	347	7	65	109	8
4	599	33	35	340	8	66	101	8
5	566	30	36	332	8	67	93	8
6	536	20	37	324	8	68	85	7
7	516	11	38	316	9	69	78	7
8	505	9	39	307	9	70	71	6
9	496	7	40	298	8	71	65	5
10	489	6	41	290	7	72	60	5
11	483	5	42	283	6	73	55	4
12	478	5	43	277	6	74	51	4
13	473	6	44	271	7	75	47	5
14	467	6	45	264	8	76	42	5
15	461	6	46	256	9	77	37	5
16	455	7	47	247	9	78	32	5
17	448	6	48	238	9	79	27	4
18	442	6	49	229	9	80	23	3
19	436	6	50	220	8	81	20	2
20	430	5	51	212	7	82	19	2
21	425	5	52	205	7	83	16	2
22	420	5	53	198	7	84	14	2
23	415	6	54	191	7	85	12	2
24	409	6	55	184	8	86	10	2
25	403	6	56	176	8	87	8	2
26	397	6	57	168	9	88	6	2
27	391	7	58	159	8	89	4	1
28	384	7	59	151	8	90	3	1
29	377	7	60	143	7	91	2	1
30	370	6	61	136	7	92	1	1

TABLE IV.

Shewing the Probabilities of Life at BERLIN, formed from the Bills for Four Years, from 1752 to 1755, given by Mr. SUSMILCH,[c] in his *Gottliche Ordnung*, Vol. II. page 37, Tables.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	1427	524	33	361	7	65	112	6
1	903	151	34	354	7	66	106	7
2	752	61	35	347	8	67	99	7
3	691	73	36	339	9	68	92	6
4	618	45	37	330	[illegible]	69	86	6
5	573	21	38	320	10	70	80	6
6	552	15	39	310	10	71	74	6
7	536	13	40	300	10	72	68	6
8	523	9	41	290	9	73	62	5
9	514	7	42	281	8	74	57	5
10	507	5	43	274	7	75	52	5
11	502	4	44	266	7	76	47	5
12	498	4	45	259	7	77	42	5
13	494	4	46	252	7	78	37	5
14	490	4	47	245	7	79	32	4
15	486	4	48	238	7	80	28	4
16	482	5	49	231	7	81	24	3
17	477	5	50	224	7	82	21	2
18	472	5	51	217	7	83	19	2
19	467	6	52	210	7	84	17	2
20	461	6	53	203	8	85	15	2
21	455	6	54	195	8	86	13	2
22	449	6	55	187	8	87	11	2
23	443	7	56	179	8	88	9	2
24	436	8	57	171	8	89	7	1
25	428	9	58	163	9	90	6	1
26	421	9	59	154	9	91	5	1
27	412	9	60	145	8	92	4	1
28	403	9	61	137	7	93	3	1
29	394	9	62	130	6	94	2	1
30	385	9	63	124	6			
31	376	8	64	118	6			
32	368	7						

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[c] This writer has also given the bills of the parish of St. *Peter's* at BERLIN, for 24 years; and a Table formed from them, agrees nearly with this.

These Tables exhibit, in a striking light, the *difference* between the duration of human life, in *great cities* and in the *country*. I will here lay some of the chief particulars of it before the reader, desiring him to take with him this consideration, that, for the reasons I have explained, they can be erroneous only by giving the difference much too *little*.

Proportion of Inhabitants dying annually in

Pais De Vaud.	Country Parish in Brandenburg.	Vienna.	Berlin.
1 in 45	1 in 45	1 in 19½	1 in 26½[f]

Ages to which half the born live.

Pais De Vaud.	Country Parish in Brandenburg.	Vienna.	Berlin.
41	25½	2	2¼

Proportion of Inhabitants[g] who reach 80 Years of Age.

Pais De Vaud.	Country Parish in Brandenburg.	Vienna.	Berlin.
1 in 21½	1 in 22½	1 in 41	1 in 37

The

The numbers *born* at BERLIN, during the 4 years abovementioned, were, *males*, 9219; *females*, 8743: or 21 to 20.
The numbers that died under 2 years of age, were, *males*, 3118; *females*, 2623; or 7 to 6.
The numbers that died upwards of 80 years of age, were, *males*, 135; *females*, 215; or 5 to 8.
The numbers that died between 91 and 105, were, *males*, 21; *females*, 55.

[f] See p. 67. This proportion, were there either no increase, or but a slow increase at BERLIN, would probably be found to be much the same with that in VIENNA and LONDON.

[g] It should be recollected here, that a considerable part of

those

The probabilities of living one Year in

	Pais De Vaud.	Country Parish in Brandenburg.	Vienna.	Berlin.
At birth	4½ to 1	3½ to 1	1⅕ to 1	1¾ to 1
Age 12	160 to 1	112 to 1	84 to 1	123 to 1
25	117 to 1	110 to 1	66 to 1	50 to 1
30	111 to 1	107 to 1	56 to 1	44 to 1
40	83 to 1	78 to 1	36 to 1	32 to 1
50	49 to 1	50 to 1	27 to 1	30 to 1
60	23 to 1	25 to 1	19 to 1	18 to 1

EXPECTATIONS of Life.

	Pais De Vaud.	Country Parish in Brandenburg.	Vienna.	Berlin.
At birth	37 years	32½ years	16½ years	18 years
Age 12	44⅕	44	35¼	35½
25	34¾	35½	28⅓	27⅓
30	31¼	31½	25½	25¼
35	27½	28	22½	22¾
40	24	25	20½	20¾
45	20½	21½	17¾	18¾
50	17½	18	16	16⅓
55	14½	15	13½	14
60	12	12¼	11¾	12½

those who die turned of 80 years of age in great towns, are *emigrants* from the country, who came to them in full maturity, after escaping the weakness of infancy. And that also in general these *emigrants* consist of the more hearty and robust part of the kingdom. On both these accounts the number of inhabitants (including *aliens* as well as *natives*) attaining old age in great towns ought to be much greater than in the country. In *London*, *Vienna*, and *Berlin*, it ought to be nearly *double*; but we see, that, in reality, it is scarcely *half*. There are no observations from which the proportion of *natives* in great towns, who live to 80, can be deduced with correctness, except those made at *Stockholm*; and these prove, that of females one in 100, and of males one in 300, live to 80.——See p. 45; and Table XLVI; and the General Introduction to the Tables.

From this comparison[h] it appears with how much truth great cities have been called the graves of mankind. It must also convince all who will consider it, that, according to the observation at the end of the Second Essay, it is by no means strictly proper to consider our diseases as the original intention of nature. They are, without doubt, in general, our own creation. Were there a country, where the inhabitants led lives entirely natural and virtuous, few of them would die without measuring out the whole period of the present existence allotted them; pain and distempers would be unknown among them; and death would come upon them like a sleep, in consequence of no other cause than gradual and unavoidable decay. Let us then, instead of charging our Maker with our miseries, learn more to accuse and reproach *ourselves*.

The reasons of the baleful influence of great towns, as it has been now exhibited, are plainly,

First, The irregular modes of life, the luxuries, debaucheries, and pernicious customs, which prevail more in towns than in the country.

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[h] A more distinct and striking comparison of this kind may be drawn from the Tables for *London* and the parish of *Holy-Cross*; and from the Tables for *Stockholm* and *Sweden* at large in the following collection of Tables. See the introduction to these Tables.

Secondly, The foulness of the air in towns, occasioned by uncleanliness, smoke, the perspiration and breath of the inhabitants, and putrid steams from drains, church-yards, kennels, and common-sewers.—It is, in particular, well known that air, spoiled by breathing, is rendered so noxious, as to kill, instantaneously, any animal that is put into it. There must be causes in nature[i] continually operating, which restore the air after being thus spoiled. But in towns it is, probably, consumed faster than it can be adequately restored; and the larger the town is, or the more the inhabitants are crowded together, the more this inconvenience must take place.

But I must proceed to some more of Mr. *Muret's* observations.——At the end of the Second Essay, &c. I have given an account of several facts which prove the probabilities of life to be higher among females than males. Agreeably to this it appears, that in the district of VAUD, half the *females* don't die till the age of 46 and upwards, though half the *males* die under 36. This great difference is in some measure owing to the military and commercial emigrations among the males; but it appears undeniably, that their greater mortality contributes likewise to it. The number of *males* who died, for a course of years, in 39 parishes of this district, was 8170; of *females* 8167; of whom the numbers that died under one year of age were 1817 *males*, and 1305 *females*; and under 10 years of age, 3099 *males*, and 2598 *females*. In the *beginning* of life, therefore, and before any emigrations can take place, the rate of mortality among *males* appears to be much greater than among *females*: And this is rendered yet more certain, by the account Mr. *Muret* gives of the proportion of the deaths among males and females in the *first* year of life at VEVEY. In this town, he acquaints us, that for 20 years ending in 1764, there died in the first month, of *males* 135, to 89 *females*; and, in the first year, 225 to 162.——To the same effect it appears, from a Table given by *Susmilch*[k], that in BERLIN 203 *males* die in the first month, and but 168 *females*; and in the first year, 489 to 395; and also, from a Table of *Struyck's*, that in HOLLAND, 396 *males* die in the first *year*, to 306 *females*.—What is most of all remarkable is, that these accounts shew, that both at VEVEY and BERLIN the *still-born males* are to the *still-born females*, as 30 to 21, or nearly in the proportion given by the accounts referred to in p. 109.

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[i] A celebrated and excellent philosopher has for some time been employed in enquiring into these causes; and, among other curious and important facts, he has discovered, that one of these causes is the vegetation of plants, and the action of light upon them. See the Fourth and Fifth Volumes of Dr. *Priestley's* Experiments on Air; and an Oration on presenting him with a prize-medal, delivered by Sir *John Pringle*, President of the Royal Society.——See, likewise, *Experiments on Vegetables, discovering their Power of purifying common Air in Sunshine*, &c. by Dr. *Ingenhouz*, Counsellor of the Court, and Body Physician to their Imperial and Royal Majesties, F. R. S. &c.

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[k] See *Susmilch's Gottliche Ordnung*, Vol. II. p. 317, &c.

The whole number of inhabitants at VEVEY in 1764, was 3350. Of these 1931 were females, and only 1419 males. Sixty-six were *widowers*, and 200 *widows*. The number of *bachelors*, above 16 years of age, was 529; and of *virgins*, above 14 years of age, 734. See Mr. *Muret's* Tables, p. 124.

Mr. *De Parcieux* at PARIS, and Mr. *Wargentin* in SWEDEN, have observed, that not only *women* live longer than *men*, but that *married* women live longer than *single* women. The registers examined by Mr. *Muret* confirm this; and it appears in some of them, that, of equal numbers of *single* and *married* women between 15 and 25, more of the former died than of the latter, in the proportion of 2 to 1. This is a difference so great, that it must, I suppose, have been in some degree accidental. The fact, however, in general, when understood with abatements for that part of female life which is most exposed to the dangers of child-bearing, is highly probable; for first, the women who marry are likely to be a select body, consisting of the more healthy and vigorous part of the sex. And secondly, it is reasonable to expect that in this, as well as in all other instances, the consequences of following nature must be favourable.

The facts recited here, and at the end of the Second Essay, prove[1], that there is a difference between the mortality of males and females.—I must however observe, that it may be doubted, whether this difference, so unfavourable to males, is *natural*; and the following facts will prove, that I have reason for such a doubt.

It appears, from several registers in *Susmilch's* works, that this difference is much less in the *country parishes* and *villages* of BRANDENBURG, than in the *towns*: And, agreeably to this, it appears likewise, from the accounts of the same curious writer, that the number of males in the country comes much nearer to the number of females.

In 1056 small *villages* in BRANDENBURG, the *males* and *females*, in 1748, were 106,234, and 107,540, or to one another as 100 to 101$\frac{1}{7}$. In twenty small *towns* they were 9544, and 10,333; or as 100 to 108$\frac{1}{7}$. In BERLIN they were, exclusive of the garrison, 39,116 and 45,938; or as 100 to 117$\frac{1}{7}$.

At the time the accounts, mentioned in p. 49, were taken of the inhabitants in the province of NEW-JERSEY in AMERICA, they were distinguished particularly into *males* and *females* under and above 16.

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[1] This is put out of all doubt in the present Edition of this work, by the Tables in the following collection, deduced from the *Chester* and *Sweden* observations.

In 1738, the number of
Males under 16 was, 10639. Females 9760.
Males above 16 —— 11631. Females 10725.

In 1745, these numbers were
Males under 16 —— 14523. Females 13754.
Males above 16 —— 15087. Females 13704.

The inference from these facts is very obvious. They seem to shew sufficiently, that human life in males is more brittle than in females, only in consequence of adventitious causes, or of some particular debility, that takes place in polished and luxurious societies, and especially in great towns[m].

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[m] See on this subject the remark at the end of Table XLVI.

It will not be amiss to insert here the following accounts of the mortality of *summer* compared with that of *winter*, that is, of the four months, *June, July, August*, and *September*, compared with *December, January, February*, and *March*.

The deaths for 60 years at VEVEY in the former months, were to the deaths in the latter, as 2140 to 1697, or 5 to 4. (See Mr. *Muret's* Tables, p. 100.) In LONDON and at PARIS, this proportion is nearly the same. At EDINBURGH, as 4 to 3. In 25 country towns and parishes mentioned by Dr. *Short* (*New Observations*, p. 142) as 50 to 41.——The sick admitted into the *Hôtel Dieu* at *Paris*, for 40 years, from 1724 to 1763, were, in the former months, 314,824; in the latter, 238,522, or as 4 to 3, See *Recherches sur la Population*, &c. par *M. Messance*, p. 181.——It is remarkable that the births also in winter to those in summer, are, at VEVEY, as 5 to 4; in LONDON, as 8 to 7; in the country towns and parishes just mentioned as 7 to 6.

Annual average of births and deaths in all SWEDEN *for* 13 *years.—See the Memoirs of the Royal Academy of Sciences at* Stockholm, *published at* Paris, 1772, p. 20, &c.

	Births	Deaths
In the four summer months	28080	18880
In the four winter months	31327	20690
In *April* and *May*	14078	12274
In *October* and *November*	17178	8612

Annual average of births and deaths in STOCKHOLM, *for five years.* Ibid.

	Births	Deaths
Summer	933	1515
Winter	870	1139
April and *May*	426	739
October and *November*	469	645

Whole number of births and deaths at Gainsborough, *for* 20 *years ended at* 1771.

	Births	Deaths
Summer	779	590
Winter	811	765
April and *May*	427	390
October and *November*	410	345

Whole number of deaths at WARRINGTON *in* Lancashire, *for eight years ended at* 1780.

	Deaths
Summer	692
Winter	968
April and *May*	508
October and *November*	280

Whole number of births and deaths at MANCHESTER, *for nine years ended at* 1780.

	Births	Deaths
Summer	3308	1788
Winter	3608	2427
April and *May*	1956	1098
October and *November*	1736	1022

Whole number of births and deaths at ECCLES *near* MANCHESTER, *for five years ended at 1779.*

	Births	Deaths
Summer	440	415
Winter	521	455
April and *May*	314	226
October and *Novembvr*	212	234

The deaths at CHESTER, for the years 1772, 1773, and 1774, were, in summer, 340; in winter, 478; in *April* and *May*, 185; in *October* and *November*, 274. And they were more numerous in *Autumn* than *Spring*, only because in one of these years the small-pox carried off 90 persons in *October* and *November*.

Of

Of POPULATION; *the general Causes which promote or obstruct it; and the* present *State of it in* ENGLAND *compared with its State* formerly.

FROM the proportion of the births to the deaths in the district of VAUD, as mentioned in p. 118, it follows, by the rule in the Note, p. 52, that the inhabitants ought to double their own number in 120 years. But the fact is, that so many migrate into foreign armies and with commercial views, that their increase is scarcely sensible. Mr. *Muret*, after observing this, enters into a general account of the causes which obstruct population in his country. Among these he insists particularly on LUXURY and the ENCROSSING OF FARMS. I wish his observations on these subjects were not applicable to the present state of this kingdom: But, perhaps, there is no kingdom in the world to which they are *so* applicable.—In consequence of the easy communication, lately created, between the different parts of the kingdom, the LONDON fashions and manners and pleasures, have been propagated every where; and almost every distant town and village now vies with the capital in all kinds of expensive dissipation and amusement. This enervates and debilitates; and, together with our taxes, raises every where[a] the price of the means of subsistence checks marriage, and brings on poverty, dependance, and venality. With respect, particularly, to the custom of *engrossing farms*, Mr. *Muret* observes, with the highest reason, that a large tract of land, in the hands of one man, does not yield so great a return, as when in the hands of several, nor does it employ so many people; and, as a proof of this, he mentions two parishes in the district of Vaud, one of which (once a little village) having been bought by some rich men, was sunk into a single *demesne*; and the other (once a single *demesne*), having fallen into the hands of some peasants, was become a little village. How many facts of the former kind can this country now furnish? And there is reason to apprehend they will go on increasing. The custom of engrossing farms eases *landlords* of the trouble attending the necessities of little tenants and the repairs of cottages.—A great farmer, by having it more in his power to speculate

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[a] The price of corn, in particular, has for some time been complained of by the poor as oppressively high, though far from being so high as it generally was at the end of the last century. This is a striking fact which implies that the lower part of the nation are now more distressed than ever. The consequence has been a reduction of their number; and this is the effect that must go on increasing, with increasing luxury and taxes.

and command the markets, and by drawing to himself the profits which would have supported several farmers, is capable, with less culture, of paying a higher rent. Their superiors, therefore, find their account in this evil. But it is, indeed, erecting *private* benefit on *public* calamity; and, for the sake of a temporary advantage, giving up the nation to depopulation and distress.——We have, for many years, been feeling the truth of this observation[b].

Dr. *Davenant* (the best, while not venal, of all political writers), tells us, that at *Michaelmas*, in the year 1685, it appeared by a survey of the hearth-books[c], that the number of houses in all England and Wales was 1,300,000, of which 554,631 were houses of only one chimney. See Dr. *Davenant's* Works, Vol. II. p. 203.—In his *Essay on Ways and Means*, &c. Vol. I. p. 33, he gives a particular account of the number of houses in every county, according to the *hearth-books* of Lady-day, 1690; and the sum total then was 1,319,215.—At the *restoration* it appeared by the same hearth-books, that the number of houses in the kingdom[d], was 1,230,000.—In the interval, therefore, between the *restoration* and the *revolution*; the people of England had increased above 300,000; and "of "smaller tenements, Dr. *Davenant* ob-"serves[e], there had been, from 1666 to 1688, "about 70,000 new foundations laid."—But what a reverse has taken place since?—In 1759 the number of houses in England and Wales was 986,482; of which not more than 330,000 were houses having less than seven windows; and 282,429 were *cottages* not charged on account of poverty.——In 1765, notwithstanding the increase of buildings in LONDON, the number of houses was reduced to 980,692[f]; of which 276,149 were *cottages* not charged. According to these accounts then, our people have, since the year 1690, decreased near a *million and a half.* And the waste has fallen principally on the inhabitants of cottages; nor indeed could it fall any where more unhappily; for, from cottages our navies and armies are supplied, and the lower people are the chief strength and security of every state.[g]——

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[b] "Those who contribute towards the destruction of "small farms" (says a gentleman of great knowledge and experience in this way) "can have very little re-"flection. If they have, their feelings are not to be "envied. Where this has been the practice, we see a "vast number of families reduced to poverty and misery, "the poor rates much increased, the small articles of "provision greatly diminished in quantity and number, "and consequently augmented in price."—See *Hints to Gentlemen of Landed Property*, printed for Mr. *Dodsley in* 1776, p. 223, &c. &c.; where the pernicious tendency of large farms seems abundantly proved. There are thousands of parishes, he says, which, since little farms have been swallowed up in greater, do not support so many cows as they did by 50 or 60 in a parish; and the inhabitants have decreased in proportion.——He concludes his observations on this subject with expressing "his anxious wishes that the destructive practice of en-"grossing farms may be carried no farther, the stab al-"ready given by it to plenty and population having greatly "affected the prosperity of this country."

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[c] At this time there was a tax of two shillings on every *fire-hearth*; which was taken off at the Revolution, because reckoned "not only a great oppression to the poorer "sort, but a badge of slavery on the whole people, expos-"ing every man's house to be entered into and searched "at pleasure by persons unknown to him." *Preample to the Act for taking away the revenue arising by hearth-money.* 1 William and Mary, Chap. 10.

[d] Continuation of *Rapin*, Vol. I. p. 53.

[e] Dr. *Davenant's* Works, Vol. I. p. 370.

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[f] See *Considerations on the Trade and Finances of this Kingdom*, p. 95, 97, 98, printed for *Wilkie*, 1766. See also p. 20, &c. of this volume; and my *Appeal to the Public on the Subject of the National Debt*, p. 86, &c.—It deserves particular notice, with respect to the accounts here given of the number of houses in 1759 and 1765, that, being returns made by the surveyors of the house and window-duties throughout all ENGLAND and WALES, they are subject to no such deficiencies as those in the account of the number of houses in LONDON, taken by Mr. *Maitland* from the *parish* books, and mentioned in the Note, p. 20.—The reason is, that no landlord or tenant can ever consent that any *two or more houses* belonging to him, should be charged by the assessors of the window-tax as *single* houses; because, in this case, he would be taxed too high, and pay more than the law required. The number of houses, therefore, subject to the house and window-duty, given in the above returns, must probably be the full number of such houses in the kingdom.

[g] Cottagers are indisputably the most beneficial race of people we have: "They are bred up in greater "simplicity, live more primitive lives, more free from "vice

What renders this calamity more alarming is, that the inhabitants of the cottages thrown down in the country, fly to LONDON and other towns, there to be corrupted and perish[h].—I know I shall be here told that

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" vice and debauchery, than any other set of men of the " lower class; and are best formed and enabled to sustain " the hardships of war, and other laborious services. " Great towns are destructive both to morals and health, " and the greatest drains we have; for where many of " the lower sort of people crowd together, as in *London*, " *Norwich*, *Birmingham*, and other manufacturing towns, " they are obliged to put up with bad accommodations, " and an unwholesome and confined air, which breeds " contagious distempers, debilitates their bodies, and " shortens their lives. Since, therefore, it is apparent " that all such towns must cause a diminution or waste " of people, we cannot be at a loss to trace the spring " which feeds these channels. The country must be the " place; and cottages and small farms the chief nurseries " which support population."—*Hints to Landed Gentlemen*, p. 243, 244.—In what follows a representation is made of the misery of cottagers in their present state, and proposals offered for better accommodating and encouraging them, which do honour to Mr. *Kent's* public spirit and humanity.

[h] Dr. *Davenant* says, from Mr. *King's* Observations, " that the supply of LONDON alone takes up above *half* " the neat increase of the kingdom."—Is it then to be wondered at, that the supply of the waste in *all* the towns of the kingdom, added to that increase of luxury and taxes, and of the drain to our *armies*, and *navies*, and *foreign settlements*, which has taken place within these 70 years, should have so far exceeded the increase of the kingdom, as to produce the depopulation I have mentioned?—It has been asserted by political calculators, that no population can bear more than one soldier for every hundred souls. This is saying a great deal too much;

that the *Revenue* thrives. But this is not a circumstance from which any encouragement can be drawn. It thrives, by a cause that is likely in time to destroy both itself and the kingdom; I mean, by an increase of luxury[i], producing such an increase of *consumption* and *importation* as secretly *accelerates* ruin, while *at present* (as far as the Revenue is concerned) it overbalances the effects of depopulation.——What remedies can be applied in such circumstances?—The answer is obvious.

Enter immediately into a decisive enquiry

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much; but were it true, the number of our soldiers and sailors, even in *peace*, would alone be sufficient to reduce us to nothing in a little time.

A flourishing commerce, though favourable to population in some respects, is, I think, on the whole, extremely unfavourable; and, while it flatters, may be destroying: particularly, by increasing luxury, the worst enemy of population, as well as of public virtue; and, by calling off too many persons from agriculture to unhealthy trades and the sea-service.—Suppose 100,000 soldiers and sailors, added to other burthens, to have been formerly the whole number the nation could bear without decreasing. In such circumstances, it is plain, that any causes which doubled or tripled that number, would depopulate with rapidity.

[i] For example. In LONDON, those who used to satisfy themselves with *one* house; or perhaps *half* a house, must now have *two* houses. Those who used to live plain, must now live high; and those who used to *walk*, must now be *carried*. This is the reason of the increase of consumption and of buildings in LONDON, and not an increase of the inhabitants, for the number of inhabitants is certainly (if any regard is due to the bills) less now than it was fifty years ago.

into the state of population in the kingdom.—Promote agriculture.—Drive back the inhabitants of towns into the country.—Establish some regulations for preserving the lives of infants. Discourage luxury, and celibacy, and the engrossing of farms. Let there be entire liberty; and maintain public peace by a government founded, not in *constraint*, but in the *respect* and the *hearts* of the people.—But above all things, if it be not now too late; "find out means of avoiding the mise-"ries of an impending bankruptcy, and of "easing the nation of that burden of debts "and taxes under which it is sinking."

I will here enter a little more minutely into the consideration of some of the heads now mentioned, and of the present compared with the former state of the body of the people in this kingdom.

One of the most obvious divisions of the state of minkind is, into the *wild* and the *civilized* state. In the former, man is a creature rude, ignorant, and savage; running about in the woods; and living by hunting, or on the spontaneous productions of the earth. In this state, the means of subsistence being scarce, and a large quantity of ground necessary to support a few, there can never be any inconsiderable increase. In the latter state, man is a creature fixed on one spot, employing himself in cultivating the ground, and enjoying the advantages of science, arts, and civil government. Of this last state there are many different degrees or stages, from the most simple to the most refined and luxurious. The first or the simple stages of civilization, are those which favour most the increase and the happiness of mankind: For in these states, agriculture supplies plenty of the means of subsistence; the blessings of a natural and simple life are enjoyed; property is equally divided; the wants of men are few, and soon satisfied; and families are easily provided for. On the contrary. In the refined states of civilization property is engrossed, and the natural equality of men subverted; artificial necessaries without number are created; great towns propagate contagion and licentiousness; luxury and vice prevail; and, together with them, disease, poverty, venality, and oppression. And there is a limit at which, when the corruptions of civil society arrive, all liberty, virtue, and happiness must be lost, and complete ruin follow. Our *American* colonies are at present, for the most part, in the first and the happiest of the states I have described; and they afford a very striking proof of the effects of the different stages of civilization on population. In the inland parts of NORTH-AMERICA, or the back settlements, where the modes of living are most simple, and almost every one occupies land for himself, there is an increase so rapid as to have hardly any parallel. Along the sea-coast, where trade has begun to introduce refinement and luxury, the inhabitants increase more slowly: and in the maritime towns (if I may judge from the bills of mortality at BOSTON, mentioned in p. 42,) they do not increase at all[k].

But to confine my thoughts to my own country. Here, it is too evident that we are far advanced into that last and worst state of society, in which false refinement and luxury multiply wants, and debauch, enslave, and depopulate. Among the evils of this state, and the causes of depopulation, I have mentioned the accumulation of property.

"Only revive (says Mr. *Susmilch*) the "laws of *Licinius*, forbiding any Roman "to hold more than seven *jugera* of land; "or that of *Romulus*, which limited every "Roman to two *jugera*, and you will soon "convert a barren desart into a busy and "crowded hive." The doubts of some ingenious men on this subject, have, indeed, greatly surprized me. I can scarcely think of a more evident maxim, than that "the "division of property promotes population." —Let a tract of ground be supposed in the hands of a multitude of little proprietors and tenants, who maintain themselves and families by the produce of the ground they occupy, by sheep kept on a common, by poultry, hogs, &c.; and who, therefore, have little occasion to purchase any of the means of subsistence. If this land gets into the hands of a few great farmers, the consequence must be, that the little farmers will be converted into a body of men who earn their subsistence by working for others, and who will be under a necessity of going to market for all they want[1]. And, subsistence in this way being difficult, families of children will become burdens, marriage will be avoided, and population will decline.—— At the same time there will, perhaps, be more labour, because there will be more compulsion to it. More bread will be consumed, and, therefore, more corn grown; because there will be less ability of going to the price of other food. Parishes, likewise, will be more loaded, because the number of poor will be greater. And towns and manufacturers will increase, because more will be driven to them in quest of places and employments.—This is the way in which the engrossing of farms naturally operates: And this is the way in which, for many years, it has been actually operating in this kingdom.

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[k] Along the sea-coast they double their own number in about 35 years; but in the back settlements, in 15 years. See *Essay* I. p. 49; and p. 109 of *A Discourse on Christian Union*, by Dr. STYLES, the worthy President of the College of YALE in CONNECTICUT.

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[1] "Every speculative Englishman," says Mr. *Kent*, "who travels through the *Austrian Netherlands*, is astonished at the great population of that country, and at "the sight of the markets, which are plentiful beyond "description. Upon enquiring into the internal state and "regulation of the country, he finds that there are no "large farms, no class of men who pass under the character of gentlemen farmers, acquiring large fortunes "merely by superintending the business of farming; but "that the whole country is divided into much smaller "portions than land is with us, and occupied by a set of "laborious people, who in general work for themselves, "and live very much on a footing of equality."—— See *Hints to Gentlemen of Landed Property*, p. 217.

It deserves particular notice, that the observations now suggested shew, that the very causes which produce depopulation among us, may, for some time, promote tillage; and I will take this opportunity to add, that they will also account for the following fact.—In the year 1697, wheat was at £.3 a quarter, and other grain proportionably dear. But there was no clamour, and the exportation went on. See a valuable and useful pamphlet, entitled, *Three Tracts on the Corn Trade*, page 100, 107, 145. At present, though the quantity of money (or, of what passes for money) is doubled, when wheat is below this price, and in general before any grain, except oats, gets above the prices at which the law used to allow a bounty on exportation, there is an alarm, the poor are starving, and the exportation is prohibited. I referred to this fact in the Note, p. 138; and the true reason of it seems to be, that the high price of bread was not, at the time I have mentioned, of essential consequence to the lower people, because they could live more upon other food which was then cheap; and because also being more generally occupiers of land, they were less under a necessity of purchasing bread. Whereas now, being forced by greater difficulties, and the high price of all other food, to live principally or solely on bread, if that is not cheap, they are rendered incapable of maintaining themselves.

In confirmation of this account, I will beg leave to mention, that though during the whole last century, corn (wheat, rye, oats, and barley) was generally dearer than it has been, at an average for 40 years to 1773; yet flesh-meat was about half its present price: And that, in an *Act of Parliament* of the 25th of Henry VIII. beef, veal, pork, and mutton are mentioned as the food of the poor, and their price limited to about a halfpenny a pound. Beef and pork, in particular, were sold in LONDON at two pounds and a half, and three pounds for a penny; at the same time that wheat was at 7s. and 8s. a quarter[m], and bore the same proportion to the price of flesh as it would bear now, were it at about £.4 a quarter, See *Chronicon Pretiosum*, p. 116.—It appears, indeed, that our ancestors took great care to keep the price of flesh low for the

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[m] Even so far back as the year 1463, the price of wheat was reckoned not too high at 6s. 8d. per quarter; nor that of barley at 3s, and rye at 4s.; for it was in that year enacted, that the *importation* of these three sorts of grain should not be allowed till they got above these prices. See Mr. *Anderson's Chronological Deduction of Commerce*, Vol. I. p. 280.

poor;

By a statute of 1 *Philip* and *Mary*, 1553, leave was given to *export* these three kinds of grain till they rose to these prices. *Ib.* p. 387.

By an ordinance in 1563, the exportation prices were fixed to 10s. per quarter for *wheat;* 8s. for *rye*, *pease*, and *beans*; and 6s. 8d. for *malt*.—And in 1593, to 1l. for *wheat*; 13s. 4d. *pease* and *beans*; and 12s. *barley* and *malt*. Ib. p. 401 and 442.

PRICES per QUARTER.

		Of Wheat.			Of Malt.			Of Oats.		
		£.	*s.*	*d.*	*£.*	*s.*	*d.*	*£.*	*s.*	*d.*
In	1491,	0	14	8	0	0	0	0	00	0
	1494,	0	4	0	0	0	0	0	00	0
	1504,	0	5	8	0	0	0	0	00	0
	1512,	0	6	2	0	4	0	0	2	0
	1521,	1	0	0	0	0	0	0	00	0
From 1553 to —	1556,	0	8	0	0	5	0	0	00	0
Before harvest, in	1557,	2	13	4	2	4	0	0	00	0
After harvest, in	1557,	0	8	0	0	5	0	0	10	0
	1560,	0	8	0	0	5	0	0	5	0
Before harvest, in	1574,	2	16	0	0	0	0	0	00	0
After harvest, in	1574,	1	4	0	0	0	0	0	00	0
	1587,	3	4	0	0	0	0	0	00	0
A dearth occasioned by excessive exportation; and in 1596 by great rains	1594,	2	16	0	0	0	0	0	00	0
	1595,	2	13	4	1	0	0	0	00	0
	1596,	4	0	0	1	6	8	0	00	0
	1597,	5	4	0	2	6	4	0	00	0
AVERAGE PRICE.										
From 1606 to —	1706,	1	18	6	1	2	0	0	00	0
From 1707 to —	1765,	1	12	6	1	1	9	0	00	0
From 1766 to —	1772,	2	3	6	0	0	0	0	19	0

See

poor; and this was one of the reasons of the many proclamations published by Queen *Elizabeth*, *James* I. and *Charles* I. against eating flesh in Lent and on fish-days; and against

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See Bp. *Fleetwood's Chronicon Pretiosum*, from p. 113 to p. 121; and *Three Tracts on the Corn Trade*, p. 98, &c.

With these prices of *corn* let us compare the prices of *flesh*, at two or three different periods.

In 1512, the price of wheat was from 5s. 8d. to 6s. 8d. in *Yorkshire*. See the *Regulations and Establishment of the Houshold of Henry Algernon Percy, the fifth Earl of Northumberland, at his Castles of Wresill and Lekingfield, in Yorkshire*, begun Anno Dom. 1512, page 2, 4. Let us call the mean price 6s. 2d. The price of malt was 4s. and of oats 2s. We may therefore reckon, that the *nominal* price of grain at this time was about a seventh of its *nominal* price for the last 40 years.

The price of a fat ox at the same time, and in the same county, was 13s. 4d.; of a lean ox, 8s.; of a wether, 1s. 8d.; of a calf, 1s. 8d.; of a hog, 2s. Ib. p. 5, 6, 7.—The nominal price of meat, therefore, was no more than about a 15th of its present price, and bore the same proportion to the price of corn that it would now bear, were it at *half* its present price.—A like inference may be drawn from comparing the following prices:

Wheat, in 1549, was about 12s. per quarter in LONDON. Malt, 10s. Barley, 9s. Rye, 6s. 6d. Oats, 4s. —A middling ox, 1l. 18s. A wether, 3s. Butter, *three farthings* and a *penny* a pound, Cheese, a *halfpenny* a pound. See *Maitland's* History of London, page 143, 144.

"In 1574, there was a great dearth, and wheat was "before harvest, at 2l. 16s. per quarter; and beef at "*Lammas* so dear, as to be sold at twopence halfpenny "a pound," See *Chronicon Pretiosum*, p. 123. That is, beef compared with wheat, was at least one half cheaper than it is now.

In

against the erection of new buildings in *London*, and the residence in it of the nobility and gentry.

The reason now assigned accounts farther for the great variations in the price of grain which used to take place formerly. These were such as could not be now endured; but, bread being then less a necessary article of subsistence, they were less felt and regarded.

I have taken for granted, in those observations, that the quantity of ground brought

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In 1445, wheat was at 4s. 6d. per quarter. In 1447, at 8s. In 1448, at 6s. 8d. In 1449, 5s.—A bullock, in 1445, 5s. A sheep, 2s. 5½d. A hog, 1s. 11½d. ——Fine cloth for surplices, in 1446, 8d. per ell. Clothing for a year, at the same period, of a common servant of husbandry, 3s. 4d. Of a chief carter and shepherd, 4s. Of a bailiff of husbandry, 5s. Ib. page 108, 109, 160.—*Clothing*, therefore, at this time, seems to have been cheaper in comparison of the price of corn than even flesh.

The weight of silver coin *formerly*, to the weight of silver coin of the same denomination *now*, was, from 1461 to 1509, as 62 to 37¼. From 1509 to 1543, as 62 to 45. From 1552 to 1600, as 62 to 60. And from 1600 to the present time as 62 to 62. But nothing depends on this in the present enquiry; the object of which is, not the proportion of the prices of the different articles of subsistence *now* to their prices *formerly*, but the proportion TO ONE ANOTHER of their prices *now*, in comparison with the same proportion *formerly*. And this may be as well deduced from the *nominal* as from the *absolute* prices.—Thus. The price of bread now is nearly the same that it was 100 years ago; but, in *comparison* with the price of beef and mutton, it is at least *one half* cheaper.

under tillage in this kingdom is now more than ever it was. This is generally believed; and, if true, the causes of it have been those I have mentioned, in conjunction with the encouragement given to the growth of corn by the bounty on exportation, and the increase of luxury occasioning an increase of horses, and rendering even the poor averse to all bread except that made of the [n] finest flour. But, perhaps, the fact may not be so certain as some think it. At least, there is reason to apprehend, that whatever the increase of tillage might have been for 50 or 60 years after the Revolution, it is now at an end.—I have lately received an account of a large common field in *Leicestershire*, which used to produce annually 800 quarters of corn, besides maintaining 200 cattle; but which now, in consequence of being inclosed and getting into few hands, produces little or no corn; and maintains no more cattle than before, though the rents are considerably advanced.—This is only one instance among many of an evil that has been prevailing for some time, and which is the general effect of the laws for inclosing open fields.—In *Northamptonshire* and *Leicester-*

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[n] Bread made of *bran*, and even of *pease* and *beans*, was formerly not uncommon among the lower people. But no distresses could force them now to eat such bread, or even to live upon *rice*, though the food of a considerable part of the rest of mankind. See the *Earl of Northumberland's Household Book*, Preface, p. 13, &c.

shire, inclosing has greatly prevailed; and most of the new-inclosed lordships, says a very sensible writer, " are turned into pasturage; in consequence of which, many " lordships have not now 50 acres ploughed " yearly, in which 1500, or at least 1000 " were ploughed formerly; and scarce an " ear of corn is now to be seen in some that " bore hundreds of quarters.—And so severely are the effects of this felt, that " worse wheat has been lately sold in these " counties on an average, at 7*s*. and 7*s*. 6*d*. " the *Winchester* bushel, for many months " together, than used to be sold at 3*s*. 6*d*. " and 4*s*. And 5*s*. and 5*s*. 6*d*. has been " given for malt that has been usually " bought there at little more than half-a-" crown." See a pamphlet, entitled, *An Enquiry into the Reasons for and against inclosing Open Fields*, by the Rev. Mr. *Addington*. Published in 1772 for Mr. *Buckland, Paternoster Row.* In the counties of *Northampton* and *Leicester*, says the same writer, p. 43, " the decrease of the inhabi-" tants in almost all the inclosed villages in " which they have no considerable manu-" facture, is obvious to be remarked by " every one who knew their state 20, or 30 " years ago, and sees them now; and that " to a degree that cannot but give every " true friend to his country the most sen-" sible concern. The ruin of former dwell-" ing-houses, barns, stables, &c. shew every "one who passes through them that they "were once better inhabited. A hundred "houses and families have, in some places, "dwindled into eight or ten. The land-"holders, in most parishes that have been "inclosed only 15 or 20 years, are very few "in comparison of the numbers who occu-"pied them in their open field state. It is "no uncommon thing to see four or five "wealthy graziers engrossing a large in-"closed lordship, which was before in the "hands of 20 or 30 farmers, and as many "smaller tenants or proprietors. All these "are hereby thrown out of their livings "with their families, and many other fa-"milies which were employed and sup-"ported by them." *Ib,* p. 37. See an account of *Norfolk*, in some respects similar to this, in my *Appeal to the Public on the Subject of the National Debt*, p. 93, &c. I can scarcely think of any thing that should be more alarming than such accounts.—How astonishing is it that our parliament, instead of applying any remedy to these evils, should chuse to promote them, by passing every year, bills almost without number for new inclosures°?

The

° I have here in view inclosures of *open fields and lands* already improved. It is acknowledged by even the writers in defence of inclosures, that these diminish tillage, increase the monopolies of farms, raise the prices of provisions, and produce depopulation. Such inclosures, The device, says Lord *Bacon*, (*Essays, civil and moral,* Sect. 20.) "of King Henry VII. "was profound and admirable, in making "farms and houses of husbandry of a "standard; that is maintained with such "a proportion of land to them, as may "breed a subject in convenient plenty and "no servile condition, and to keep the "plough in the hands of the *owners* and "not *hirelings*." "Inclosures," says the same great writer (in his History of the Reign of *Henry the Seventh*), "began at "that time (or in 1489) to be more fre-"quent, whereby arable land was turned "into pasture, which was easily managed "by a few herdsmen. This bred a decay "of people. In remedying this inconve-"nience, the King's wisdom and the Par-"liament's was admirable. *Inclosures* they "would not forbid; and *tillage* they would "not compel; but they took a course to "take away *depopulating inclosures*, and *de-"populating pasturage* by consequence. The "ordinance was, that all houses of husban-

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sures, therefore, however gainful, they may be at present to a few individuals, are undoubtedly pernicious.—On the contrary. Inclosures of *waste lands and commons* would be useful, if divided into small allotments, and given up to be occupied at moderate rents by the poor. But if, besides lessening the produce of fine wool, they bear hard on the poor by depriving them of a part of their subsistence, and only go towards increasing farms already too large, the advantages attending them may not much exceed the disadvantages.

"dry, with 20 acres of ground to them, "should be kept up for ever, together with "a competent proportion of land to be occupied with them, and in no wise to be "severed from them. By these means, the "houses being kept up, did, of necessity, "enforce a dweller; and the proportion of "land for occupation being also kept up, "did, of necessity, enforce that dweller not "to be a beggar[p]." The statute here mentioned was renewed in King *Henry* the Eighth's time; and every person who converted tillage into pasture subjected to a forfeiture of half the land, till the offence was removed. See Mr. *Anderson's Chronological Deduction of Commerce*, Vol. I. page 347.—In a law of the 25th of the same reign, it is set forth, "that many farms, and great "plenty of cattle, particularly sheep, had "been gathered into few hands, whereby "*the rents of lands had been increased, and* "*tillage very much decayed*; churches and "towns pulled down; the price of provisions excessively enhanced, and a marvellous number of people rendered incapable of maintaining themselves and families; and, therefore, it was enacted, "that no person should keep above 2000 "sheep, *nor hold more than two farms.*" Ib. p. 363. In the 3d of *Edw.* VI. a bill was brought in for the benefit of the poor, for rebuilding decayed farm houses, and maintaining tillage *against too much inclosing*, Parliamentary Hist. Vol. III. p. 247. In the year 1638, there was a special commission from *Charles* I. for enforcing the statute of the 39th of *Elizabeth*, by which no cottage was allowed in any country place, without at least four acres of land to it, to prevent the increase of the poor, by securing to them a maintenance; nor were any inmates allowed in any cottage, to secure the full cultivation of the land, by diffusing the people more over it. See *Rymer's Fœd.* 20, 256, and 340.—By an Act in *Cromwell's* time, no new house was to be built within ten miles of LONDON, unless there were four acres of land occupied by the tenant. *Parliamentary History*, Vol. XXI.

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[p] See Lord Bacon's Works, Vol. III. p. 431.

Such was the policy of former times.—*Modern* policy is, indeed, more favourable to the higher classes of people; and the consequence of it may in time prove, that the whole kingdom will consist of only *gentry* and *beggars*, or of *grandees* and *slaves*.

I cannot conclude this Supplement without adding one farther observation which has struck me on the present subject. As in former times the number of the occupiers of land was greater, and all had more opportunities of working for *themselves*, it is reasonable to conclude, that the number of people willing to work for *others*, must have been smaller, and the price of day-labour higher. This is now the case in our *American* colonies; and this likewise, upon enquiry, I find to have been the case in this country formerly.——The *nominal* price of day-labour is at present no more than about *four* times, or at most *five* times higher than it was in the year 1514. But the price of corn[q] is *seven* times, and of flesh-meat and raiment about *fifteen* times higher. See the Note, p. 149.—So far, therefore, has the price of labour been from advancing in proportion to the increase in the expences of living, that it does not appear that it bears now *half* the proportion to those expences that it did bear formerly[r].

Upon the whole. The circumstances of the lower ranks of men are altered in almost every respect for the worse. From little occupiers of land, they are reduced to the state of *day-labourers* and *hirelings*; and at the same time their subsistence in that state is become more difficult, in consequence of the cause just assigned; and also of *luxury*, which has extended its influence even to them, though starving, and rendered *tea*, *fine wheaten bread*, and other delicacies, necessary to them, which were formerly unknown among them.—Such a change cannot but draw after it important consequences. They are the lower people chiefly who pay the taxes of a state, fight its battles, carry on its commerce, and maintain its splendor. In every country, the higher ranks are a very small body, compared with them. Even in this country, where their numbers are probably much lessened, they are still more the majority than is commonly imagined; for, from the returns made by the surveyors of the house and window-duties, it appears, that near THREE-FOURTHS of all the houses in the kingdom are houses not having more than *seven* windows[*].

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[q] See *Chronicon Pretiosum*, Chap. V. From whence, compared with the account in Chap. IV. of the price of corn and other commodities, for the last 600 years, abundant evidence for what I have here observed, may be collected.

[r] "The balance at present is considerably against the "labourer; and yet the landlord and tenant derive ulti-"mately no advantage from hence.—The great increase "in the poor rates may be accounted for in a few words. "The rise upon land and its produce, is at least 60 *per* "*cent.*; the rise upon labour not above 20 *per cent.* "The difference is of course against the working hands; "and when their earnings are insufficient for the ab-"solute necessaries of life, they must inevitably fall upon "the parish." *Hints to Gentlemen of Landed Property*, p. 273.

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[*] If the Survey in 1801 be correct, FIVE SIXTHS nearly of all the houses in the kingdom are of this description. M.

POSTSCRIPT,

CONTAINING

A Review of the Controversy relating to the State of Population in England *and* Wales *since the Revolution.*

THE observations, in the preceding Supplement, on the population of this kingdom, are the same with those which have been published in the former editions of this work. A more particular account of the evidence which seems to prove a progressive decrease in our population, has been given in an ESSAY on this subject first published at the end of Mr. *Morgan's* Treatise on the *Doctrine of Annuities and Assurances on Lives and Survivorships,* and since republished with the addition of an *Appendix,* containing remarks on Mr. EDEN's objections in his fifth letter to Lord CARLISLE. These publications have been lately followed by others on the same subject; particularly, Mr. *Wales's Enquiry into the present State of the Population of* ENGLAND *and* WALES; and Mr. *Howlett's* Examination of Dr. *Price's* Essay on the Population of *England*; and a pamphlet entitled *The Uncertainty of* *the present Population of this Kingdom, deduced from a candid Review of the Accounts lately given of it by Dr.* PRICE *on the one Hand, and Mr.* EDEN, *Mr.* WALES, *and Mr.* HOWLETT, *on the other.*

In the Preface to the ESSAY just mentioned, fearing that I might have expressed my conviction too strongly, I referred myself to the candour of the Public, and desired that my assertions might not be regarded any farther than they were supported by undeniable facts. The prospect of an increasing depopulation is so discouraging, that nothing but the fairest overbalance of evidence should engage us to admit it. I thought such evidence did exist, and, therefore, stated it; believing that satisfaction ought never to be founded on imposition, and that by endeavouring to apprize the kingdom of its true state, I might be doing it an important service.——The ingenious Author of the pamphlet last mentioned, writes in the character of one who doubts, and wishes only to know how things are; but Mr. *Wales* and Mr. *Howlett* zealously maintain, in opposition to the arguments I have produced, that our population is increasing fast. My intention in this *Postscript* is to give as fair and yet as brief an account as I can of the present state of this dispute, by reciting the evidence offered on both sides, and making such remarks upon it as shall appear to me necessary.

The principal evidence to prove that our population has declined, is taken from the comparison stated in page 140 of this Volume (but more particularly in the ESSAY), between the number of houses in the kingdom at different periods from the Revolution to the present time.

Houses in *England* and *Wales* at Lady-day 1690 - 1,319,215 including 554,631 having only one hearth.

	Charged and chargeable.	Excused for poverty.	Total.
Houses in 1750	729,048	. . .	. . .
in 1759[*]	704,053	282,429	986,482
in 1761	704,543	276,149	980,692
in 1777	701,473	251,261	952,734

The number of houses at Lady-day 1690, is stated distinctly by Dr. *Davenant* for every county (see his Works, Vol. I. p. 38); and represented by him as an important instruction derived from the hearth-books then existing, and containing accounts fairly kept and stated. *Ib*. p. 136, 378.

The numbers for the subsequent years are given from the returns to the tax-office of the surveyors of the house and window-duties in every district in the kingdom, made by the order of government in those years.

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[*] This year was the first in which an order was given to return the cottages excused for poverty.——The chargeable or uninhabited houses in this year, and in 1761 and 1777, were 24,904, 25,628, and 19,396 respectively. See the Essay on the Population of *England* and *Wales*, printed for Mr. *Cadell*, p. 10 and 12.

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A comparison of these numbers with those given by Dr. *Davenant,* affords an evidence which, as far as it can be trusted, is full and DECISIVE. I know of nothing which has been urged against Dr. *Davenant's* account, except that by *houses* he meant *families*; but it has been observed, that the difference between the number of *families* and *houses* in the kingdom, is by no means considerable enough to account for the excess in Dr. *Davenant's* total; and that, were the contrary true, it is evident he must have meant *houses,* because he has divided this total into two numbers (namely, 1,208,000 and 111,215) the first of which he supposes to be the number of houses having *ground* about them; and the second, the houses not having ground about them.

The principal objections which have been made to the other accounts are the following.

First; the cottages are included in them, and these being excused, and no account kept of them, the surveyors could not be correct in returning them.

This is certainly true. But it should be remembered, that the same objection holds against the returns of the cottages made from the hearth-tax; that if in any instance such returns have been made from *conjecture,* they are more likely to exceed the truth, than to fall short of it; and that it is quite incredible that these returns should be so deficient as not to give above two out of five of the true number; or that the cottages of the poor should be almost equal to all the other houses in the kingdom, which must be the case if there has been no decrease.——I have been, however, assured that in some districts, the returns of the cottages have been made from actual surveys, and may be depended on.——And, if in other districts, they have been made carelesly, or perhaps in some not at all, an allowance on this account of an omission of *half* the cottages would still leave the number of houses short of what it was formerly.

According to the returns, the decrease in the cottages has been much more considerable than in the other houses; and, in the interval between the last two returns, amounted to 24,888. Such an authority only as the returns of the cottages, gives no sufficient reason for believing this. But there are two facts which give it credibility. The first is, that acknowledged destruction of cottages which has been the consequence of the increase of large farms. And the other is, that decrease of the houses *charged* having seven windows or less, amounting to 24,651, which took place in the same interval of time. See the account of this decrease in the Essay on the population of *England* and *Wales*, p. 11.——To this nothing has been opposed but a strange objection of Mr. *Howlett's*, implying, that, on account of the diſtreſſes of the poor, it is not poſſible that theſe houſes and the cottages ſhould decreaſe together.

The ſame writer has endeavoured to diſcredit all the returns to the tax-office, by obſerving, in p. 60, that they have repreſented the number of houſes as diminiſhed (ſince 1755) in ſome places where it is known they have increaſed. He inſtances in *Thaxted* in *Eſſex*, conſiſting of 350 houſes; two pariſhes in the ſame county and one in *Kent*, conſiſting between them of only 206 houſes; and *Maidſtone*, conſiſting of 1106 houſes. He gives no other proof that theſe places have not decreaſed than a bare aſſertion; and if I may judge from his principal inſtance (or *Maidſtone*), his account of the returns for theſe places deſerves no regard. According to him, the return of the houſes for this town in 1777 was 633, and leſs by 23 than in 1755: Whereas the number returned in that year of inhabited houſes only paying the houſe and window-duties, and therefore excluſive of all the other houſes (which were included in the general return for the county) was 727; as any one may know who can either enquire at the tax-office, or will conſult the accounts printed by the Houſe of Commons in 1781.

Mr. *Howlett*, after making this objection to the tax-office accounts, informs the public (p. 62), from the authority of ſome ſurveyor of the window duties, that *doubtleſs* there

was

was no return at all of the cottages in 1777. ——It is difficult to account for so gross an error. In the first session of the present parliament, Lord MAHON moved the House of Commons for an account of all the returns to the tax-office of the houses in the kingdom. In consequence of this motion, the general return for 1777 was, among other returns, laid by the commissioners of the tax-office before parliament. This return was afterwards printed, and it distinctly specifies the number of cottages, as well as of other houses, in *every* county; and it is the same with the return for 1777 which I have given at the beginning of this Postscript, but more at large in the Essay on the Population of *England* and *Wales*.

After finding Mr. *Howlett* so mistaken in this and some other instances[1], I might, I think, be excused were I to save myself the trouble of taking any farther notice of him. There are, however, some other mistakes into which he has fallen, still more important and palpable, which in what follows it will be proper to mention.

In this argument, a great deal depends on the proportion of the houses *charged* and *chargeable*, and consequently entered in the books of the assessors, to the whole number of houses in the kingdom. The return in 1777 makes this proportion to be as 701,478

[1] See p. 27, and 31, 32, 33.

to 952,734, or as 3 to 4 nearly. See p. 163. A comparison of this proportion with the like proportion in a great variety of parishes and towns in different parts of the kingdom, ascertained by careful enumerations, would shew how far it deviates from truth, and what addition ought to be made to the excused houses, in order to obtain the whole number of houses.——I am not possessed of many such accounts. Those which I think most to be depended on are the following.

	Total of Houses.	Houses charged.
Beccles in *Suffolk* - -	468	297
Bungay - - -	326	220
Henham, Sotherton, Shipmeadow, Weston, and two other parishes in *Suffolk* -	135	106
Wenhaston[m] in *Suffolk* - -	76	73
	1005	696

Southwold,

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[m] Only 56 houses have been reckoned in this parish; but in the office accounts 73 houses are charged, in consequence of the division of several cottages deemed single houses, into two or three separate dwellings, holding so many families.——One of the excused houses in this parish (and also in *Bungay*) is an alms-house, and in this account reckoned but one house, though consisting of several apartments, and therefore capable of being reckoned 5 or 6 houses; and in all accounts of this kind it should be remembered, that some differences will arise, as a house or cottage containing two or more families, having no communication, is reckoned a single or two or more houses.

Weston

	Total of Houses.	Houses charged.
Brought over - -	1005	696
Southwold, Aldeburgh, Orford, and *Gorlestone*, parishes in *Suffolk* - - -	720	563
Remainder of the district in *Suffolk* in which these parishes are - -	5906	4859
Warrington in *Lancashire*, with its vicinity -	1941	558
Sandwich in *Kent*[n] -	578	349
Christleton in *Lancashire*, by an exact survey in 1780	102	72
First totals - -	10,252	7097
Add *Sudbury* division -	7740	4122
Second totals -	17,992	11,219

Weston parish consists only of 21 houses, *Shipmeadow* of 11, *Henham* of 15, and *Sotherton* of 24. It is not conceivable that any parishes should have been always so small; and yet there are multitudes of such parishes in *Suffolk, Norfolk, Northamptonshire, Sussex, Kent*, and some other counties, and some of them provided with large churches. In *Norfolk*, particularly, the dilapidated churches in *some* places, and their disproportionate size in *others*, prove that it must have been formerly more populous. Even NORWICH itself bears evident marks of having been once a much more considerable city.

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[n] According to an accurate account taken by Mr. *Boys* in 1776, the number of inhabitants was 2252, or $3\frac{9}{10}$ to a house; though *three* workhouses containing 33 persons, and *two* hospitals containing 21 persons, are reckoned as only five families.

Accounts collected by Mr. *Wales.* See his *Enquiry*, p. 39, 43, 47, &c.

	Total of Houses.	Houses charged.
The two divisions of *Agbridge* and *Morley* in the West Riding of *Yorkshire*,	21,929	12,832
Twenty-eight villages in *Northamptonshire* -	1024	706
Westhall, Wangford, Holton, Spexhall, Swilland, Tuddenham, Westerfield, Wisset, Witnesham, Blythford, and *Bramfield*, parishes in *Suffolk*	391	351
Ashill, Clapton, Ilminster, and *Wayford*, in *Somersetshire* - -	388	134
Third totals -	23,732	14,023
Add the *Second* totals -	17,992	11,219
Fourth total -	41,724	25,242

If we may judge from the first totals, which are those alone in which from my own enquiry I can confide, and which (including in them a town with its vicinity full of the poorest manufacturers, where the proportion of charged houses is lower than I have found it any where else) may not possibly be an improper guide in this case, the proportion of charged to the whole number of houses will be as 7097 to 10,252. And, since the charged and chargeable houses are known by the returns in 1777 to have been then 701,473, the whole number of houses in the kingdom will come out 1,013,000, or nearly a million, as I have reckoned it. If we add to these totals those of SUDBURY and its neighbourhood, where also (because full of poor manufacturers) the proportion of charged houses is particularly low, the number of houses in the kingdom will come out 1,125,000.——If we judge by the accounts Mr. *Wales* has collected, this number will come out 1,187,000.—— If we judge by all these accounts taken together it will come out 1,159,000.

All these determinations shew a great diminution in the number of houses since the *Revolution*, nor (supposing Dr. *Davenant's* account right, or even not *very* wrong) is it possible to reckon it equal now to what it was then without contradicting all probability.

A confirmation of this might be derived from Mr. *Howlett's* accounts, could they be trusted. He has (in his Examination of Dr. *Price's* Essay, p. 139, &c.) given a list of towns and parishes in 20 different counties, in which the total of houses is 29,262 by *enumeration*, and 17,225 by the *returns* of the surveyors. The last of these totals includes in it only the *charged* houses; and it gives a proportion of these to all the houses in the kingdom, which makes their number 1,191,000. But the truth is, that Mr. *Howlett's* account of the returns of the surveyors cannot at all be depended on; and the following particulars will abundantly prove this.

The numbers returned for *Beccles*, *Bungay*, *Shipmeadow*, *Mettingham*, and *Homersfield* in *Suffolk*, were in 1780 *, according to him, 169, 260, 7, 21, and 21 for these places respectively.——I am assured, on the contrary, that the numbers (when the last general return was made in 1777) were 297, 220, 11, 27, and 23, returned as charged; and 171, 106, 0, 3, and 11, returned as *excused*.—The numbers returned for *Northampton*, *Maidstone*, *Chester*, and *Shrewsbury*, he makes to be 768, 623, 1227, and 967 respectively; whereas it appears, from the accounts printed by the House of Commons in 1781; that the numbers returned to the tax-office for these towns in 1777, were, 706, 727, 1244, and 904, exclusive of the *uninhabited*, and *excused* houses which were likewise returned, but included in the totals for the counties.

But Mr. *Howlett* has here fallen into a still greater mistake; for, through haste or inattention, he has taken the numbers in his list (being in reality only the number of houses *taxed* given very inaccurately) for the whole of the numbers[p] *returned,* including *uninhabited* and *excused* houses; and, arguing upon this mistake, he makes the houses in the kingdom 1,609,555; which is above a third more than, by computing in his own way, he must have found them had he not fallen into this mistake[q].

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* There was no return in this year.

It

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[p] "The number of houses in Mr. *Howlett's* list said to "be returned for *Tenterden* in *Kent,* is 96, the total 198. "A correspondent, on whose veracity I can depend, "assures me that these 198 houses are all in the parish "duplicate; and that the 96 are those which are "charged."—*Uncertainty of the Population of this Kingdom,* p. 24.

[q] Mr. *Howlett,* in consequence of thus over-rating the number of houses, and allowing 5 and two-fifths to a house, makes the inhabitants of *England* and *Wales* to be near nine millions. The proportion of inhabitants to houses may be, in some measure, collected from the Table in p. 6th of the Essay on the *Population of England and Wales,* which has been reprinted with some additions at the end of the First Essay in this Volume; To the towns and parishes in that Table I will here add SANDWICH in KENT, where, by an accurate survey in 1776, the houses were found to be 578, and the inhabitants 2252, or 3$\frac{9}{10}$ to a house; and also EASTRY in the same county, where, in 1774, the houses were 141, and the inhabitants 656, or 4$\frac{1}{3}$ to a house.—The total of houses in that Table, with these added, is 45,217; and of inhabitants 231,842, which makes 5 and an eighth to a house.

Mr. *Howlett* has inserted in his *Examination,* &c. p. 144, the houses and inhabitants in *Birmingham, Norwich, Manchester, Nottingham,* and *Liverpool,* just as I had given them in the Essay on the *Population of England,* &c. but with such additions as to bring out the allowance just mentioned 5 and two-fifths to a house. But had Mr.

Howlett

It is necessary to observe, that the method here used of deducing the total of houses

Howlett chosen to add to his own list the *whole* of my list in the Essay, as well as that part of it just mentioned which gives the highest allowance, he would have found (taking 4338 for the number of houses at *Manchester* and *Salford* in 1773, and not 4268 as he makes it) the total of houses to be 41,030, and of inhabitants 244,422; and consequently the allowance to a house not to be so much as five and one-fifth to a house.

Mr. *Howlett's* additions, with SANDWICH and EASTRY, and the additions which have been made (in the Table in p. 70) to the Table in the Essay on the *Population of England and Wales*, will make the total of houses 52,036, and of inhabitants 268,568, and the allowance 5 and a sixth.

It should be considered, that these totals, consisting chiefly of the houses and inhabitants in five of the most populous towns in the kingdom, give most probably a proportion of inhabitants to houses too high for the kingdom at large. If we throw out BIRMINGHAM and the town of MANCHESTER, the remainder will perhaps make a properer mixture of great and small towns and country parishes; and the totals (or 41,675 and 210,158) will give $5\frac{1}{20}$ to a house. If LIVERPOOL is likewise thrown out, the totals will give less than 5 to a house.

In the Table just referred to I have given the number of houses and inhabitants at *Birmingham* from a survey in 1770; when the houses were 6025, and the inhabitants 30,804; of whom 15,363 were males, and 15,441 females.——I have lately been informed that, according to a very accurate survey of *Birmingham* in autumn 1782, the houses (exclusive of the hamlet of *Deretend*) were then 8125, of which 291 were uninhabited. From the same account I learn, that the annual average of burials at *Birmingham* (exclusive of *Deretend*) for four years to 1774, was 1116; and for six years to 1780, was 1342.——The number of inhabitants in 1770, divided by the *first* of these averages, makes the proportion dying annually at *Birmingham* to be one in $27\frac{3}{5}$; which, being very nearly houses in the kingdom from the proportion (ascertained by surveys) of the houses taxed to

nearly the same with the proportion dying annually at *Liverpool* and *Manchester*, cannot probably be far from right: and this number (or 27⅗) multiplied by the *second* average, makes the inhabitants in 1780 to be 37,039. In order, however, to allow for the increase of *Birmingham*, and to be more sure of finding a number not less than the truth, let the burials in 1782 be reckoned 1500, and the proportion dying annually 1 in 28; and it will follow that the inhabitants were then 42,000, and the number of persons in a house 5⅛, including about 700 in the workhouse and hospital.——I am sensible that this falls below the common estimates; but I pay no regard, in cases of this kind, to any estimates which are not derived from careful surveys.

The annual average of births at *Birmingham* was (according to the register) 1408 for 10 years to 1780. The excess of the births above the deaths is plainly owing to that over-proportion of people in the first stages of mature life, which always takes place in towns, in consequence of their being kept up or increased by an influx of people from other places. See the First of the following additional Essays. That this is the cause of the increase of *Birmingham* is undoubted, for the excess of the births cannot account for a 40th part of the increase; and before it became so rapid as it has been for some time, the burials *exceeded* the births, the annual average of the former having been, if the register deserves any regard, 708; and of the latter, 619.——The same register makes the annual medium of burials for 10 years to 1697 to have been 158, and of births, 150. But this only confirms an observation before made, that the registers in former times were very deficient; for it is not probable, that *Birmingham* was then so small a town; and an old account which I have seen of a survey in 1700 makes it to consist in that year of 2504 houses, and 15,032 inhabitants. The register, therefore, did not then give above a third of the births and burials.

In p. 71, I have also given the number of houses and inhabitants to the totals of houses in country towns and parishes, must be too favourable; because this

inhabitants at *Maidstone* in *Kent*, from a survey in 1781. I have since learnt, that another survey was made at *Maidstone* in *September* 1782; and as some instruction may be derived from it, I will here give the results just as I find them in a pamphlet published in this town by Mr. *Howlett*, and entitled, *Observations on the increased Population, Healthiness*, &c. of the town of *Maidstone*.

	Families.	Houses.	Inhabitants.	Males.	Females.	Male servants.
In the town -	1037	982	5028	2306	2722	145
In the country -	139	133	727	357	370	41
In the *whole* parish	1176	1115	5755	2663	3092	186

	Female servants.	Women above 70.	Men above 70.	Girls under 15.	Boys under 15
In the town -	325	161	96	847	776
In the country	40	9	10	165	144
In the *whole* parish	365	170	106	1012	920

Persons to a house *in* the town - -	$5\frac{1}{18}$
In the parish *out* of the town - -	$5\frac{1}{2}$
Persons to a family *in* the town - -	$4\frac{5}{6}$
In the parish *out* of the town - -	$5\frac{1}{4}$
Proportion of children under 15 to the total of inhabitants *in* the town	as 100 to 309
In the parish *out* of the town -	as 100 to 235

In the town one in 17 of the women exceeds 70 years of age, and one in 24 of the men; but in the country only one in 41 of the women exceeds this age, and one in 36 of the men.

Annual average (according to the register) in the whole parish for 20 years—

Of births to 1702	130	Of marriages	29	Of burials	132
to 1722	120	-	30	-	118
to 1742	129	-	40	-	144
to 1762	143	-	46	-	140
to 1782	160	-	50	-	148

By a survey in 1695, the inhabitants were 3676.

From

this proportion in *London*, *Southwark*, and all *Middlesex*, (containing at least an 8th or 9th

From these particulars it seems to appear, that *Maidstone*, at the beginning of this century, was a *de*creasing town; but that lately it has been *in*creasing, not by an excess of births, but, like other towns, by drawing supplies from other places. The ratio of the births to the burials (if it can be depended on) and the great over-proportion of persons in mature life in the town, prove this.

The number of females in it turned of 70 is greater than the number of males, partly, because males are more short-lived, but chiefly in this instance because the males, after removing to the town, are taken off again to the navy, army, &c. And the proportion of both males and females turned of 70 in the country is smaller than in the town, because removals from thence are chiefly to the town; and these being also chiefly removals of females, the town is rendered, at every age, much fuller of females than of males.

It is farther observable, that the town, when compared with the country round it, appears to be particularly unfavourable to population, the proportion of children under 15 being much less there than in the country.—The same is remarkable in the country round *Manchester*. See the First of the following additional Essays.

It seems, indeed, that the consumption of towns tends to promote the population of the country near them; and were they fed with people only from hence, they would not probably be so prejudicial as they are to population. But the fact is, that there are few towns which would not soon come to nothing, did they draw their supplies of people only from the adjacent country. So true is this of *London* in particular, that, notwithstanding this natural tendency of its consumption, there is scarcely a village or parish within ten or twelve miles of it, in which, if we may believe Mr. *Howlett's* extracts from the registers, the births do not fall considerably short of the burials. See his *Examination*, &c. p. 96, 97, &c.

In a note at the beginning of the First of the following

9th of the kingdom) is, and, for obvious reasons, must be much higher than it is in the other districts of the kingdom. The returns in 1777 make the houses taxed in *London*, *Southwark*, and all *Middlesex* to be 77,008, and the total of houses 90,570; whereas the same returns for the whole kingdom make the former to be 701,473, and the latter 952,734.——I think it worth adding, that from a return for *London* and *Middlesex*, in 1780, and laid before parliament, it appears that the number of empty houses in this part of the kingdom had increased, between 1777 and 1780, from 3,381 to 6,810.

The evidence now insisted on, taken from the returns of the surveyors and assessors of the house and window-duties, is the only direct evidence comprehending the whole kingdom with which we are furnished on this subject; and it is so discouraging, that I do not wonder that the advocates for the increase of our population endeavour to discredit it; and I should certainly join them in this, were I less desirous to know things

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additional Essays, it appears that the number of houses at MANCHESTER, exclusive of *Salford*, in 1773, was 3446, including 44 empty houses. My friend Dr. *Percival* has just informed me, that at the end of last year (1782) a new and very accurate enumeration of this town (exclusive of *Salford*) was completed, which made the houses then to be 4606. An addition, therefore, has been made to MANCHESTER of 1160 houses within the last ten years.

as they are, than to prove them what I wish them.—The care and attention of Mr. *Rose* (now one of the secretaries to the treasury, but lately the secretary of the tax-office), in collecting these returns, cannot, I believe, be doubted; and he who considers that they are founded upon old taxes, and made upon oath, will not be able easily to persuade himself that they can be very grossly deficient.

Mr. *Wales*, a writer whose abilities I respect and whose accounts I am not inclined to distrust, has collected several accounts of enumerations of houses *in* or *about* 1750 and 1780, which he thinks afford a presumptive proof of a general increase during that period. I will transcribe his summary of them, p. 48[r].

	Houses in 1750.	Houses in 1780.
North Riding in *Yorkshire*	1716	1985
Eight villages in the *West-Riding*	784	943
Seventeen villages in *Derbyshire*	1001	1348
Twenty-seven villages in *Northamptonshire* - -	1036	1024
Fourteen parishes in *Suffolk* (families)	653	704
Four parishes in *Sussex*	144	223
Four villages in *Somersetshire*	428	38[illegible]

Mr. *Wales* has added an account taken from the returns (which in this instance

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[r] In p. 67, there is a comparison of enumerations at different periods of *Manchester*, *Liverpool*, *Birmingham*, *Leeds*, *Nottingham*, *Norwich*, and *Farnham*, which shews, what is well-known concerning the four first of these towns, that they have greatly increased.

he is willing to trust) of the surveyors for *Agbridge* and *Morley* divisions in the *West-Riding* of *Yorkshire*. From these returns it appears, that in 1761 the houses in these divisions were 17,764; that in 1767, they were 20,526; and in 1779, 21,929.

I will add a similar account of a district in the county of *Suffolk*, where

In 1761	the houses *charged* were	5584
	the houses *excused* were	1391
		6975

In 1777	the houses *charged* were	6118
	the houses *excused* were	1521
		7639

There has undoubtedly been an increase in *Yorkshire*, and perhaps also in *Derbyshire*; but he that will judge of it from the numbers in these accounts will be in danger of being misled: For I understand, that it is in part an *apparent* increase only, owing to the conversion of houses holding two or more families, and *formerly* charged as *single* houses, into apartments having no communication, and therefore *now* charged as so many separate houses.——The inducements to such conversions among the lower ranks of people have been so great since 1761, as to be irresistible. For first, their poverty has increased, and therefore they have found it more necessary to save every needless expence.

pence.——And secondly, in 1761 the window-duties were nearly doubled; and houses having 8 or 9 windows, *before* excused, were subjected to the payment of 1s. *per ann.* for every window. In 1766 these duties were again increased, and houses having only *seven* windows were subjected to them. By dividing, therefore, single houses holding more than one family into several tenements having each of them few windows, the tax upon them might be either lessened or entirely avoided[a]. The decrease of small farms has likewise contributed to this change, by causing many farm-houses to be turned into cottages for day-labourers.

Perhaps, these have been the only causes of the increase of the district in *Suffolk* just mentioned; and there is reason to believe that they have been the principal causes of the increase in *Agbridge* and *Morley* divisions in *Yorkshire.* For the returns shew an increase in these divisions equal to above a 6th of the whole number of houses in so short a time as six years, or from 1761 to 1767; but afterwards, or from 1767 to 1779, they do not shew *half* this increase in *double* the time. The first increase, therefore, was probably occasioned, as I have observed, by the alteration in the window-duties in 1761; nor, indeed, could it have any other cause than either this, or the desertion of other parts of the kingdom; for it was too great and too sudden to be accounted for by an excess of the births above the deaths, which is the only cause that can produce a general and permanent increase.

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[a] In Mr. *Wales's* accounts of the increase of houses in the *North-Riding* of *Yorkshire*, and in *Derbyshire*, it appears that a great part of it proceeded from alterations in old houses; that is, perhaps, from such alterations as those here meant.

There is one more source of information on the subject of our population which is of particular importance; I mean, a comparison of the births and burials and marriages at different periods. Such a comparison for the whole kingdom would decide the question I am discussing. But we are far from being furnished with the means of making it. It is, however, the evidence on which the advocates for a progressive increase in our population principally rely; and I shall here give a fair representation of it, with such remarks as a regard to truth will render necessary.

	Baptisms.	Burials.
Annual average of baptisms and burials about or soon after the Revolution, in 33 parishes in ten counties, taken indiscriminately in different parts of *England*.—See Mr. *Wales's Enquiry*, p. 49[t]. -	1460	1518

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[t] In Mr. *Wales's* list the average of burials corresponding to the births, is not given for *Liverpool* and *Bowden* in *Lancashire*, and for *Lamborn*, *Shefford*, and *Wilford* in *Berkshire*; and, therefore, these places are not included in this account.

	Baptisms.	Burials.
Annual average in the same parishes for some years before 1780.—*Ib.* p. 50.	4064	3537
Annual average of baptisms and burials about the year 1745 in 142 parishes in 21 counties taken indiscriminately.—*Ib.* p. 53.	4712	4067
Annual average in the same parishes between 1770 and 1780.—*Ib.* 57. -	7179	6689
Annual average of births and burials in the Deaneries of *Melineth, Elvel, Buillt, Hay,* and *Brecon* in the diocese of St. *David's.*—*Ibid.* p. 65.		
From 1700 to 1730 -	341	325
From 1730 to 1760 -	715	587
From 1760 to 1763 or 1764	727	580
Annual average in the other parts of the diocese		
From 1700 to 1730 -	888	753
From 1730 to 1760 -	1111	921
From 1760 to 1763 or 1764	1302	1183
Annual average in the whole diocese of St. *David's*		
From 1700 to 1730 -	1229	1078
From 1730 to 1760 -	1826	1508
From 1760 to 1763 or 1764	2029	1663

All these accounts have been extracted from the parish registers. The deficiencies in these registers, and the carelessness with which they are kept, have been often complained of. I wish, therefore, something had been said to establish their credit; or at least to shew, that they have been preserved entire, and that they were not *more* deficient formerly than they are now[u]. Supposing them

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[u] May it not be doubted whether at the *Revolution* the parish registers had recovered from the confusion into which all church affairs had been thrown in the times of the civil war and commonwealth?——The number of popish and protestant dissenters was then probably much greater than it is now.——But the observation most to the present purpose may be, that registers of mortality are of late origin, and have been for a course of years growing more and more into use and estimation. Among the Dissenters in *London* the registration of births was, some years ago, much neglected. At present it is more practised in consequence of notifications of the establishment of a public register, which have been read annually from the pulpit. And in the country I suspect, that people of all denominations are got so much more into the habit of reckoning it important, as sometimes to register in more than one place.

“In 1538 *Henry the Eighth* gave orders that the incumbent of every parish should keep true and exact registers of all christenings, weddings, and funerals in his district. But this order, in many places, was little regarded till Queen *Elizabeth*, in 1558, gave another order for keeping them more exactly. Yet after all they were but remissly kept in many parishes, and often committed only to loose papers, by which means some were lost, some rotted away, and others were devoured. To remedy these evils, orders were given in 1559, that all registers should be kept in parchment-books only, and that all preceding ones which could them correct, they take in but a very inconsiderable part of the kingdom, and chiefly that very part which, it is well known, has increased, but the increase of which must have been, in some measure, occasioned by removals from other parts of the kingdom. The *second* of these accounts is the principal; and, if from the numbers in it are deducted the births and burials in *Manchester*, *Rochdale*, and *Warrington* in *Lancashire*; and in *Sheffield*, *Wakefield*, *Halifax*, &c. in *Yorkshire*, the remainder will be, in the first period, 1630 births *per ann.* and 1408 burials; and,

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" could be found, should be transcribed into new books. " But no place in *England* slighted these orders so much " as *London*; for, except in two or three years of great " plagues, we find no bills in *London* till 1604.——But " neither country nor city registers, where there has been, " or still is any considerable body of dissenters, popish or " protestant, are much to be relied on after 1644, when " the division in the church first broke out. And even " in places where there are no dissenters, registers are " little to be regarded on account of several unhappy " concurring circumstances, as the negligence or fre" quent absence of the register-keeper, and the igno" rance, poverty, mistakes, and *prejudices* of several of " the people."——See the preface to the *New Observations on Town and Country Bills of Mortality*, by Dr. *Short*, p. 9, &c.

In *London* the bills did not include the distempers till 1629; nor the ages till 1728; and still it is well known that they are very defective.

Conclusions drawn from registers of burials, be they ever so exact, are rendered more uncertain than is commonly imagined, by epidemics, and the different degrees of healthiness or sickliness of different years. This may be learnt in some measure from what is related of SWEDEN. See the Remarks on Tab. 44.

in the second 2010 births *per ann.* and 1502 burials, which makes a small increase.

The *first* account overthrows itself by making the burials at the *Revolution* in eleven counties to exceed the births. These counties, therefore, if we are to judge from these extracts, must have been *then* decreasing. The increase which appears at present is almost entirely the increase of the towns just mentioned; and if they are struck out, the remainder in this *first* account, as well as the *second*, will be little; and that little will shew a decrease in *Somersetshire*, no increase in *Nottinghamshire*, and only a small increase even in *Yorkshire*.

Mr. *Wales's third* list shews an increase at the beginning of this century so rapid in the diocese of St. *David's* as in 30 years to double the inhabitants of five deaneries; but, in the other parts of the diocese, so much slower, as in the same time not to add a *quarter* to the inhabitants.——It deserves notice farther, that they represent the increase which took place in the *first* period as changed into a decrease in the *second* and *third* periods. This will appear upon considering, that had the increase in the *first* period been continued to the end of the *second*, the annual averages at the end of this *second* period, (or which is nearly the same) the annual averages from 1760 to 1763, must have been much greater than they are; for they must have borne the same proportion to the averages of the *second* period that the mean between these averages and the averages of the *first* period bear to these last averages. That is, in the five deaneries, the average of burials about 1760 should have been to 587 as the mean between 587 and 325 (or as 456) is to 325. It should have been, therefore, 823 (or some number not very distant from this) instead of 586; which last number is so much too little as to be nearly equal to the annual burials about the middle of the second period; and therefore, if not very wrong, proves a decrease must have taken place.

By the same reasoning it will appear, that in the whole diocese, if the increase in the *first* period had continued, the burials at the end of the *second*, or the beginning of the *third* period should have been nearly 1808, instead of 1663. The same conclusions may be deduced by computing from the births.

These are circumstances which give a suspicious appearance to this register evidence[x]; but there is a third circumstance which destroys its credit.

At the same time that, in the five deaneries, they shew an extravagant increase in the *first* period, they give the births and burials nearly equal, and therefore make it impossible there should have been any increase[y].—The like will be observed presently of the whole diocese.

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[x] One plain reason of the inconsistencies in these accounts has been intimated, namely, that the births and burials in former periods are given by the extracts much *more* below the truth than in the latter periods. And as far as this is the case, they prove nothing.

That part of the kingdom where the parish registers give the strongest proofs of an increase is the diocese of *Chester*.——The following is a summary of the extracts from them as I have received it from a friend in the diocese.

		Births.	Burials.
In the archdeaconry of *Chester* -	in 1717,	7703	6380
	in 1779,	16791	12573
In the whole diocese	in 1717,	10604	8755
	in 1779,	21463	16080

There appears here an increase which has *doubled* the inhabitants in 62 years; and there is no reason to doubt but that this part of the kingdom (including in it some of the chief manufacturing towns in *Lancashire*, *Cheshire*, and *Yorkshire*) has considerably increased. I cannot, however, trust my belief of this merely to these extracts[z]; for they destroy their own authority by giving a proportion of the births to the burials, which is inconsistent with any such increase, as will appear from the following observations.

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[y] The births in the first period, in order to produce (in conformity to the extracts) a double number in 30 years, should have been more than double the burials; that is, supposing the burials not too high, the births should have been about 700; and both the births and burials in the *second* period, instead of being 715 and 587, should have been double these numbers.

[z] The author of the pamphlet entitled, *The Uncertainty*

If the annual average of burials about 1717 is multiplied by 35 (a multiplier which, in the case of a large *country* district cannot be much too high), it will appear that the whole number of inhabitants in the diocese was then 306,000. The excess of the births above the burials was 1849, or the 166th part of the inhabitants; and this is an excess which, supposing the increase produced by it uniformly accelerated, without being once checked by sickly seasons and emigrations (that is, supposing it a much greater increase from a given surplus of births than there is reason to expect,) could not have doubled the inhabitants in less time than 115 years, as may be found by computing in the manner directed in the Note, p. 52. If, therefore, agreeably to the parish extracts, they were doubled in 62 years, it must have been the effect, not of the excess of the births above the burials

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tainty of the Population of the Kingdom, mentions a very material circumstance relating to the registers of births kept in *Lancashire*, and some other northern counties.— "I am assured," says he, "by the most authentic information, that, in consequence of the late multiplication of chapels, it is no uncommon thing for baptisms (and sometimes burials) to be entered, in some parishes in these counties, twice over; first in the chapel register, and afterwards, for greater security, in that of the mother church, p. 28."

the only general cause of the increase of countries), but of an influx of people from other parts of the kingdom; and, therefore, proves no more than that one part of the kingdom has gained by taking away from other parts. And this may probably have happened in this diocese. The truth, however, more probably is, that the parish registers do not give us true information in consequence either of having been more deficient formerly, or not having been duly preserved. See the Notes in p. 184, &c.

This observation is applicable to all the other accounts which I have met with taken from parish registers.——In the diocese of St. *David's* there appears, by the extracts, to have been an addition (between 1715 and 1760) of *three fifths* to the inhabitants. But the excess of the births above the deaths will not account for more than a *third* of this increase; and as very probably more people leave WALES than flock into it, either (in conformity to the excess of the births) there may have been no increase, or the register in the first period must have been so deficient as to give the births near a third less than the truth[a].

This argument holds equally with respect to the second of the accounts taken from Mr. *Wales*. And his first account carries, as before observed, impossibility on the face of it.

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[a] If the burials are supposed deficient, as certainly they ought, the births must have been proportionably more deficient than the third here reckoned.

The following is a summary of Mr. *Howlett's* accounts, taken from p. 128 of his *Examination*, &c.

Annual average of births and burials for 20 years about the Revolution, compared with the annual average for the last 20 years, in 68 parishes in *Kent*, 43 in *Essex*, and 17 in *Surry*.

		Births.	Burials.
About the *Revolution*	-	2993	3054
For the last 20 years	-	3947	3983

In the same parishes, with the addition of 18 in *Sussex*, 15 in five southern counties, 29 in *Suffolk*, the city of *Norwich*, and five parishes in *Wales*.

		Births.	Burials.
About the *Revolution*	-	7553	7740
For the last 20 years	- -	10023[b]	10175

To these accounts Mr. *Howlett* has added (in p. 131) a comparison of the births and burials for two periods of *five* years in 162 parishes in 26 counties; the first period beginning

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[b] There are many errors in Mr. *Howlett's* numbers, but I have not discovered any that will materially affect the proportion of the totals here given.

In a postscript he has added to the parishes abovementioned the births and burials in 17 others; and all together make the annual averages,

	Births.	Burials.
At the Revolution..................	8375	8493
At present	11195	11389

ginning with 1758, 1760, or 1761; and the second with 1773, 1775, or 1776.

		Annual average of births.	Annual average of burials.
In the first period	-	9527	9910
In the second period	-	1191	1060

This is all the register evidence which Mr. *Howlett* has produced, exclusive of Mr. *Wales's*, and that taken from the parish registers in the diocese of *Chester* already noticed. This evidence he has displayed with great pomp, and insisted upon as a full proof of an *astonishing* increase in our population. But never before was an evidence offered so absurd and self-destructive. For it should be observed, that, according to these accounts, the deaths in the kingdom from the Revolution to the present time have exceeded the births [c]. Mr. *Howlett*, therefore, will, I hope,

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[c] It may be said, that the excess of burials in this and the other accounts before noticed, is occasioned by a great over-proportion of omissions in the registration of births. But what confidence can be placed in registers which admit of such defects? or how is it to be known that they were not much greater formerly, agreeably to the observations in the Note, p. 184?

The omission of still-born and unbaptized infants scarcely deserves notice, because they contribute nothing to population, and are probably, in most places, omitted in the burials as well as the births. And with respect to other omissions, were we to reckon them a *tenth* of the births, and only *half* as much of the burials, still an excess of births would be left, which would be almost equally inadequate to the increase.

I hope, some time or other, inform us how the increase in which he triumphs has been produced.——But to be serious: An excess of deaths cannot exist long in any kingdom. The appearance of it, therefore, in these extracts must be owing either to their being miserably erroneous; or to their being taken mostly from *towns*; for in these it seldom happens that an excess of deaths does not take place; nor is there any worse cause

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In short; let the registers of births be ever so deficient, the increase they shew must have taken place if they were not more deficient formerly than they have been lately: And yet, this increase could not take place unless they were deficient to a degree which is incredible, and which, were it credible, would render them unworthy of much notice.——The increase, for instance, which on this supposition must have taken place in the diocese of *Chester*, cannot be accounted for from the excess of births without reckoning the omissions in the registers of births equal in both periods to at least a *third* of the registered births, even though the registers of burials are reckoned correct and complete. This will appear to any one who will calculate in the manner explained in p. 189, &c. The supposition, therefore, must be wrong that the registers of births were not more deficient formerly than they have been lately.

The effect which the omission only of baptisms among Dissenters may have, will appear from the following fact. ——The number of baptisms at *Sandwich* in *Kent*, among Protestant Dissenters (exclusive of *Baptists*) was

From 1690 to 1699	120
From 1730 to 1739	58
From 1770 to 1779	13

The number of baptisms in the same town for the same periods respectively was, exclusive of Dissenters, 755, 744, and 758.

or symptom of depopulation than their increase.

All the evidence taken from the parish registers has been now laid before the reader, as far as I am acquainted with it. I am informed that Mr. *Wales* and Mr. *Howlett* are proceeding with their enquiries[d]; and I hope

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[d] I have not sought for any accounts of this kind, not chusing to give trouble to obtain so indecisive and precarious an evidence. The following are all I can add from my own information to those already given.

	Annual births	Annual burials	Annual marriages
Lincolnshire—*Swinderby* parish 10 years to 1690	7.3	7.5	2.5
to 1720	5.8	5.0	2.0
to 1770	7.1	5.0	1.4
Durham—*Staindrop* parish 10 years to 1745	37.6	28.5	7.0
to 1771	49.3	44.8	12.9
Kent—*Tenterden* parish 20 years to 1729	29.8	33.6	9.1
to 1769	34.5	34.0	11.9
Sandwich parish 10 years to 1629	148.3	159.6	41.3
to 1689	103.2	95.8	11.7
to 1739	74.4	70.4	16.3
to 1779	75.8	68.8	21.3
Eastry parish 10 years to 1629	20.1	12.1	6.4
to 1689	13.7	12.2	2.6
to 1739	17.3	13.0	4.2
to 1779	20.7	13.4	5.2
Ward parish 10 years to 1739	7.6	4.9	1.2
to 1779	6.7	4.8	2.0

I hope they will be able hereafter to offer to the public some more consistent and probable accounts. When, however, I consider the reason there is for believing that the parish registers were in former periods particularly defective, I cannot help doubting whether any examination of them is capable of furnishing with sufficient evidence to prove that our population has not decreased since the *Revolution.* I question even whether it can inform us properly of the proportion of births to deaths in the kingdom. This alone, could it be ascertained, would enable us to form some judgment of the present state of our population, and to determine, with some probability, whether it is increasing or decreasing. If we unite all the extracts before given, rejecting Mr. *Howlett's,* this proportion will come out $\frac{128}{100}$. Were these extracts

	Annual births	Annual burials	Annual marriages
Woodnesborough parish 10 years to 1719	15.5	10.9	7.3
to 1779	14.8	12.4	4.1
Ash parish 20 years to 1578	27.7	25.7	6.6
to 1777	50.0	39.7	11.9
Cornwall—*Liskeard* parish 20 years to 1719	51.7	45.3	13.0
to 1769	48.3	45.3	12.8
Devonshire—*Okeford* parish 20 years to 1719	12.2	8.0	
to 1769	12.2	7.5	
Staffordshire—*Biddulph* 20 years to 1719	20.3	15.6	4.3
to 1739	27.8	21.1	4.4
to 1769	38.9	21.1	6.1

to be depended on, they would probably give this proportion too high for the kingdom at large, because taken chiefly from the register of the diocese of *Chester*, the most populous and flourishing part of the kingdom *. We may, however, argue upon it, and reckon it the just proportion for *England* and *Wales*, exclusive of *London* and its environs; on which supposition, if we reckon the annual births such as, in consequence of multiplying by 35, will make the inhabitants of *England*, exclusive of *London*, four millions and a half, the annual burials will be nearly 128,000, and the births 164,000, leaving an annual excess of 36,000; and this is an excess which would produce an increase in most other countries, notwithstanding the waste in their capitals, and all the other causes which usually check the increase of countries[f]. But

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* Dr. *Short* has employed much time and pains in collecting extracts from the registers of a great variety of market-towns and country parishes and villages in different parts of the kingdom for two periods, the first extending from the reign of Queen *Elizabeth* to the middle of the last century; and the second from different years at the end of the last century to the middle of the present century: and from a comparison of these extracts it appears, that in the former period the births exceeded the burials in the proportion of 124 to 100: but that in the latter they exceeded them only in the proportion of 111 to 100.

This, were there sufficient evidence for it, would manifest too plainly an encumbered and declining population. It appears (as Dr. *Short* speaks) with no less evidence from the registers *than that the sun shines in a cloudless day at noon*; and he concludes from it, that in consequence of the irregularities and debauchery occasioned since the Revolution, by increasing opulence and luxury, the kingdom has been for many years growing less healthy. But the truth is, that the registers (having certainly been more defective formerly than they are at present) cannot be trusted as a just foundation for any conclusions.—See Dr. *Short's New Observations*, Tables 1st, 2d, and 3d, and p. 80.—See likewise the Preface to his *History of the Comparative Increase and Decrease of Mankind;* and the Tables at the end.

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[f] The proportion of births to deaths in all SWEDEN for 9 years to 1763 was	130 to 100
In the kingdom of NAPLES for 5 years to 1777	144 to 100
In all FRANCE for 5 years to 1774 as 928,918 to 793,931, or	117 to 100

Annual average of births, deaths, and marriages in *Breslaw*, *Glogaw*, and the other *towns* of SILESIA for four years to 1778.

Births.	Deaths.	Marriages.	Proportion of births to marriages.	Proportion of births to deaths.
10900	10935	2409	45 to 10	996 to 1000

Annual average of births, deaths, and marriages in the *country parishes and villages* of SILESIA for the same period.

Births.	Deaths.	Marriages.	Proportion of births to marriages.	Proportion of births to deaths.
53694	42894	11848	45 to 10	125 to 100

SILELIA appears from hence to consist of near two millions of inhabitants; of whom the inhabitants of towns are about a *sixth* part.

The following accounts (copied from the Tables at the end of the First Volume of Mr. *Susmilch's Gottliche Ordnung*, 3d Edition) will shew, in some measure, the usual progress of population in a country. They will also serve for a contrast to the inconsistent extracts which I have given from our parish registers; for it will appear that instead

But perhaps there are few kingdoms now existing in which most of these causes
operate

instead of shewing an increase too great for the surplus of births, they always (in consequence of sickly years and other causes) shew a much smaller increase than it was capable of producing.

In the old PRUSSIAN dominions and the provinces of *Brandenburg*.

Annual average.	Births.	Burials.	Marriages.	Proportion of births to marriages.	Proportion of births to burials.
4 years to 1701	66247	44680	18145	36 to 10	148 to 100
7 years to 1728	82934	60821	20726	40 to 10	136 to 100
6 years to 1756	102935	78863	24487	40 to 10	136 to 100

In the kingdom of *Prussia* and dukedom of *Lithuania*.

Annual average.	Births.	Burials.	Marriages.	Proportion of births to marriages.	Proportion of births to burials.
10 years to 1702	21963	14718	5908	37 to 10	150 to 100
6 years to 1716	21602	11984	4968	39 to 10	180 to 100
5 years to 1756	28392	19154	5599	50 to 10	148 to 100

N. B. In 1709 and 1710 a pestilence carried off 247,733 of the inhabitants of this country; and in 1736 and 1737 epidemics prevailed, which again checked its increase.

In the *Churmark* of BRANDENBURG.

Annual average.	Births.	Burials.	Marriages.	Proportion of births to marriages.	Proportion of births to burials.
5 years to 1702	13433	7605	3597	37 to 10	176 to 100
4 years to 1756	23486	18840	6646	38 to 10	124 to 100

Duchy of POMERANIA.

Annual average	Births.	Burials.	Marriages.	Proportion of births to marriages.	Proportion of births to burials.
6 years to 1702	6540	4647	1810	36 to 10	140 to 100
6 years to 1708	7455	4208	1875	39 to 10	177 to 100
6 years to 1726	8432	5627	2131	39 to 10	150 to 100
4 years to 1756	12767	9281	2957	43 to 10	137 to 100

In

operate so much as in this. Few kingdoms have been engaged within so short a period

In this instance the inhabitants appear to have been almost doubled in 56 years, no very bad epidemic having once interrupted the increase; but the three years immediately following the last period (to 1759) were years so sickly that the births were sunk to 10,229, and the burials raised to 15,068.

Neumark of BRANDENBURG.

Annual average.	Births.	Burials.	Marriages.	Proportion of births to marriages.	Proportion of births to burials.
5 years to 1701	5433	3483	1436	37 to 10	155 to 100
5 years to 1726	7012	4254	1713	40 to 10	164 to 100
5 years to 1756	7978	5567	1891	42 to 10	143 to 100

Epidemics prevailed for 6 years from 1736 to 1741, which checked the increase.

Dukedom of MAGDEBURG.

Annual average.	Births.	Burials.	Marriages.	Proportion of births to marriages.	Proportion of births to burials.
5 years to 1702	6431	4103	1681	38 to 10	156 to 100
5 years to 1717	7590	5335	2076	36 to 10	142 to 100
5 years to 1756	8850	8069	2193	40 to 10	109 to 100

The years 1738, 1739, 1740, 1741, 1750, and 1751 were particularly sickly.

Duchy of HALBERSTADT.

Annual average.	Births.	Burials.	Marriages.	Births to marriages.	Births to burials.
4 years to 1692	2366	1478	604	39 to 10	160 to 100
5 years to 1746	2803	2052	712	39 to 10	136 to 100
6 years to 1756	2917	2621	778	37 to 10	111 to 100

Duchy of RAVENSBERG.

Annual average.	Births.	Burials.	Marriages.	Births to marriages.	Births to burials.
5 years to 1692	3899	2552	964	40 to 10	152 to 100
4 years to 1756	5041	3814	1371	36 to 10	132 to 100

Dukedom

a period in so many desolating wars. Few kingdoms have had such armies and garrison, and

Dukedom of CLEVE and County of *Mark*.

Annual average.	Births.	Burials.	Marriages.	Births to marriages.	Births to deaths.
4 years to 1701	6249	4132	1729	36 to 10	151 to 100
5 years to 1739	7358	5535	1741	42 to 10	134 to 100
4 years to 1756	7612	5567	1966	38 to 10	136 to 100

AUSTRIAN MILANESE;

Consisting in 1774, of 211,479 families, and 1,116,859 inhabitants; and in 1769, of 1,101,723 inhabitants, of whom 9688 were priests, 5616 friars, and 7140 monks and nuns.

Annual average of	Births.	Burials.	Marriages.	Births to marriages.	Births to deaths.
1769, 1773 & 1774	44030	40030	9619	45 to 10	110 to 100

N. B. The last of these years appears to have been particularly sickly; for the burials exceeded the births, and were 9156 higher than the average of the years 1769 and 1773.

DENMARK.

Annual average of	Births.	Burials.	Births to burials.
5 years to 1747	22996	18864	121 to 100
5 years to 1756	24298	21706	112 to 100

Epidemics prevailed in 1755, and 1756, which made the burials in those years nearly equal to the births.

The medium of these ten years is nearly 20,000; and, multiplying it by 35, will make the number of inhabitants then in *Denmark* 700,000.

NORWAY.

Annual average of	Births.	Burials.	Births to burials.
5 years to 1747	17522	10955	160 to 100
14 years to 1756	19947	14661	136 to 100

Multiplying 16000 (the average of burials in *Norway* for four years to 1756) by 35, will make the number of inhabitants 560,000 in 1756.

In

and settlements to maintain in so many distant regions, and in such unhealthful climates. No kingdom ever supported such a navy, or carried on so extensive a foreign commerce, or wanted, on these accounts, such a supply of *men* for the sea-service: Nor was there ever a kingdom which consisted so much of people employed in trades and manufactures, which shorten life, or whose metropolis was so large, or *half* so large, in comparison with the number of its inhabitants.——If we include in LONDON all the parishes and little towns near LONDON, where, almost universally, the burials exceed the births; it is moderate to reckon that the former exceeds the latter in this part of the kingdom about 10,000 annually; and that, consequently, LONDON demands a recruit of people every year equal to this number. Forty years ago there was this excess of burials within the bills only. This

In 1056 country parishes and villages in the *Churmark* of *Brandenburg*, consisting (in 1748) of 106,204 males, and 107,540 females.

Annual average of	Births.	Burials.	Marriages.	Births to marriages.	Births to burials.
10 years to 1748	7099	5561	1966	36 to 10	127 to 100

In seven market-towns and 54 country-parishes in *England*, consisting (in 1740) of 10434 families and 46,650 inhabitants, according to Dr. *Short's New Observations*, p. 133.

Annual average.	Births.	Burials.	Marriages.	Births to marriages.	Births to burials.
In 1748	1575	1360	399	40 to 10	115 to 100

will make the annual surplus for the whole kingdom 26,000, which may probably be sufficient, or perhaps more than sufficient, to supply all the waste occasioned by sickly seasons, emigrations to the colonies, and the other causes I have mentioned.—But the truth is, that it cannot be reckoned with any degree of confidence, that there exists any such surplus.

Mr. *King*, in 1693, stated the births of the kingdom, exclusive of those in *London*, at 170,000, and the burials at 148,000, which makes the proportion of the former to the latter as 115 to 100. See Dr. *Davenant's* Works, Vol. II. p. 180. Mr. *King* deduced this from the assessments then imposed on births, marriages, and burials; and he has shewn such sagacity in his other estimates, that I cannot help paying some regard to him in this. If he was right, the kingdom has probably been decreasing, such a surplus being incapable of supporting a population so encumbered as ours, and which ever since Mr. *King's* time has had such increasing demands upon it.

I cannot help taking this opportunity to observe, that there is reason to believe that poor countries (provided the ground supplies them with plenty of food, and the poverty of the inhabitants consists only in their wanting *conveniencies* and *elegancies*, in other countries deemed *necessaries*) increase faster than *rich* countries. The reason is obvious. The greatest enemies of population are the artificial wants, the accumulation of property, and the luxury and vices which are the constant attendants of opulence, and which prevent a regular and early union between the sexes. The inhabitants of poor countries are more simple, more healthy, and more virtuous; and, wanting little besides food, families are no burdens, and the prolific powers of nature have free scope to display themselves.—Perhaps IRELAND is one instance of this. If we may depend on an account in the Philosophical Transactions (Abridgement, Vol. III. p. 666.) the number of people in *Ireland*, in 1695, did not much exceed a million. At present they are, I suppose, about two millions.——According to an account published annually at *Dublin*, in *Watson's* Almanack, the houses in *Ireland*, in 1754, were 395,439. In 1767 they were increased to 424,046; and in 1777 to 448,426. But I have been informed that this account is of no authority, and deserves little credit. Nor can I learn that there are in *Ireland* any *documents* from which a judgment tolerably correct can be formed of the progress and present state of its population. It might have been expected, that the hearth-tax would have furnished such *documents*: But this is not the case; and all that is known with certainty is the yearly produce of the tax; the average of which for the last five years to 1781, having been £60,648, makes the number of hearths that pay the tax (at 2s. per hearth) to be 606,480. It is supposed that a house may be allowed for every *two* hearths, and that a *third* of the houses are excused on account of inability, and, on these suppositions, the number of houses will exceed 400,000 [g]; and, consequently, the inhabitants will be (as just reckoned) about two millions [h].

Sweden,

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[g] In the year 1787 the following account was returned to the House of Commons of Ireland, of the number of houses in that kingdom paying hearth-money.

Hearths.	No. of Houses containing	Hearths.	No. of Houses containing	Hearths.	No. of Houses containing	Hearths.	No. of Houses containing
1	397,644	15	99	29	4	45	4
2	24,031	16	127	30	16	46	1
3	7,562	17	46	31	4	50	3
4	5,542	18	42	32	4	55	1
5	4,062	19	23	33	6	56	1
6	3,556	20	61	34	3	67	1
7	3,330	21	13	35	3	92	1
8	2,209	22	10	36	6	112	1
9	985	23	9	37	1	Houses exempted by law	23,075
10	772	24	20	39	1		
11	316	25	20	40	7		
12	295	26	10	41	3		
13	147	27	5	42	3		
14	139	28	8	44	2		

From this table it appears that the number of hearths (exclusive of those exempted by law) is 612,577; and therefore, on the supposition adopted in this postscript, the whole number of houses in Ireland will be 408,384.—But if the preceding accounts be accurate, their real number amounts to 474,234, and consequently the inhabitants will rather exceed two millions and a quarter. M.

[h] A survey of BELFAST was made in *Jan.* 1782, from which it appeared, that it consisted of 2026 houses, containing

Sweden, *Norway*[1], and the kingdom of *Naples*, are increasing fast; and also RUSSIA, if we may judge from the following facts.

In the viceroyalty of *Tweer* (in 1780) there died 4315 males; 3646 females; but there were born 11948 males, and 9013 females. The marriages were 6074.

In the eparchy of *Vologda* the deaths in the same year were 2688 males, and 2377 females. The births were 6517 males, and 5366 females. The marriages 3232.

In both these provinces, therefore, the births were considerably more than *double* the deaths; and the increase must be rapid.

At the beginning of the same year (1780) there were found in the district of Moscow 137,698 males, and 134,918 females; of whom died in the course of the year 2101 males and 1601 females, or the 65th part of the males, and 84th part of the females. But there were born in the course of the year 4546 males, and 4075 females, which added 5919 (or a 46th part) to the inhabitants; and the number of inhabitants ac-

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taining 13,105 inhabitants, 6133 of whom were males, and 6972 females.——Looms 388; and houses for selling beer and spirits 119, or a 17th part of all the houses.——On *Jan.* 1, 1757, the number of looms was 399, and the houses 1779, containing 8549 inhabitants, of whom 7993 were *Protestants*, and 556 *Papists*.

[1] See the Preliminary Observations to Table XLIV; and the Essay on the *Population of England*, p. 14.

tually counted at the end of the year was 140,143 males, and 137,392 females[k].

But there exists probably among mankind no such increase as that among the United States of NORTH-AMERICA, according to the account of it in p. 49, &c.

The reflection on these facts must be mortifying to this country (the richest upon earth) if it be indeed true that our population is declining. But we must comfort ourselves by considering that in this case, *value* is of more consequence than *number*. Commerce, arts, and liberty, once placed the little state of *Athens* at the head of the world; and the same causes once raised this island to the same eminence.

To the direct evidence already stated of a decrease in our population, it is proper to add the following facts.

1st. The decrease of LONDON. This I must reckon certain, till some other satisfactory reason[l] can be given for a diminution since 1727, of more than 7000 *per ann.* in the registered burials, and near 2000 in the registered births.

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[k] These accounts have been given by authority in RUSSIA; and were communicated to me by Mr. *Howard*; who with views of unparalleled humanity, travelled through that country in 1781.——To Mr. *Howard's* enquiries I likewise owe the account of SILESIA, in the Note, p. 197.

[l] The new burying grounds (taken notice of in the Notes, p. 28 and p. 33) have been opened but lately; and

Secondly. The decrease in the produce of the hereditary and temporarary excise upon beer. This was almost the only excise that existed before the Revolution; and though the country was then poorer, it produced a *quarter* more than it has lately. This fact, together with the objections to the inference I have drawn from it, may be found distinctly stated in the Essay on the *Population of England,* &c. p. 18, &c. and p. 45, &c.

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and therefore, cannot account for this diminution; nor do the burials in them amount to a number equal to it.

Annual medium of registered burials in LONDON.

For five years to 1722 inclusive	26,443
to 1727	26,747
to 1732	26,582
to 1737	26,848
to 1742	28,344
to 1748	23,884
to 1753	22,006
to 1758	20,875
to 1763	22,593
to 1768	23,319
to 1773	22,754
For four years to 1777	20,945
For three years to 1780	20,438
For two years to 1782	19,313

Annual medium of registered births in LONDON.

For five years to 1727	18,898
to 1768	16,291
to 1782	16,966

The decrease which this Table shews to have taken place lately in the excess of burials above the births, has been ascribed to an improved state of LONDON with respect to its influence on the health of its inhabitants; but the true reason is the fact referred to at the beginning of this note.

Thirdly. The growing distress among the lower orders of people, who are the majority of the nation, deserves to be particularly attended to on this subject. The increase of the poor rates proves this fact; and it seems to be universally acknowledged. A people at their ease will increase; but increasing difficulties in procuring the means of subsistence, producing a forced industry, and an aversion to marriage, must depopulate.

The increased produce of the taxes on candles, leather, &c. the inclosures of waste lands, and the improvements in agriculture which have taken place lately, have been urged in opposition to these facts. But I am afraid they only prove that luxury has increased consumption more than it has lessened the number of our people.

Upon the whole. I beg it may be remembered, that my opinion, in this instance, is by no means a clear and decided conviction. I may probably be influenced too much by a desire to maintain an assertion once delivered.—Some time or other, perhaps, the Legislature will think this a point worth its attention. Much light may be thrown upon it, and the state of our population kept constantly in view, by only ordering exact registers to be kept of the births, burials, and marriages in the kingdom. This is done in other kingdoms. It has lately been done in *France*; and the result has been a discovery that the population of FRANCE exceeds all that had been conjectured concerning it[m]. Should a like discovery be the consequence of carrying such an order into execution here, it will give the kingdom an encouragement which at present it greatly wants: and I shall rejoice in my own confutation.

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[m] See the Appendix to a Discourse on the Love of our Country, delivered by the Author on November 4th, 1789, to the Society for commemorating the Revolution in Great Britain.—In this Appendix it is observed, that the medium of annual deaths, births, and marriages, in the kingdom of France, was

Of births for four years, to 1774	914,710
Of deaths	793,931
Of marriages	192,180
Of births, for six years, to 1780	958,419
Of deaths	834,865
Of marriages	228,170

If 834,865, the number of deaths to 1780, be multiplied by 35, agreeably to the rule in p. 189, it will appear that the whole number of inhabitants in that kingdom exceeds *twenty-nine millions*. M.

OBSERVATIONS

BY

THE EDITOR.

IN consequence of an Act of Parliament passed for that purpose in the year 1802, a survey was made of the population of the kingdom; when it appeared from the accounts delivered in by the different surveyors that the number of houses in England and Wales amounted to 1,633,399,[a] the number of families to 1,896,723, and the number of inhabitants to 9,343,578—of whom 4,715,711 were males, and 4,627,867 were females.

These accounts, if they be correct, seem to contradict both observation and experience, not only in giving the proportion of inhabitants to a house much greater than they have been found in former enumerations,[b] but more particularly in making the number of males to exceed that of the females;—a circumstance I believe seldom or ever known to have taken place in any other part of the world. They exhibit also the curious phenomenon of every five houses throughout the kingdom containing six families, while there are more than 57,000 houses untenanted!—Admitting, however, the accuracy of these statements, what a melancholy proof do they afford of the impoverished condition of the country? Out of one million and a half of houses, above 800,000 are excused on account of poverty from all taxation; and even of the remainder almost one half are so wretched as to be altogether exempted from the window-rates [c], and to be charged only with the payment of three shillings a year for the house-tax.

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[a] Inhabited houses..................1,575,923
Uninhabited houses 57,476

Whole number 1,633,399

[b] See page 70, &c. in this Volume.

From a view of the manner in which this survey has been formed and conducted, it is hardly possible to imagine a measure so ill-fitted for obtaining any useful information. It appears to have been instituted for the mere purpose of determining a controversy; and even in this it has totally failed of its object. Whether the population of the country increases or diminishes;—in other words, whether the gloomy opinions of Dr. *Price* are better founded than the more sanguine assertions of his adversaries, is a point which must still remain the subject of future discussion. From these statements no accurate judgment can be formed. They leave the question involved in the same uncertainty in which they found it, and are likely to serve no other end than that of continuing the dispute among those who are more eager to maintain an hypothesis than to acquire a real knowledge of the truth.

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[c] According to the returns of the surveyors in 1777 (and they have varied very little since that time) the number of houses paying the window-tax was only 395,781.

Had the number of births and burials been given in each district during the last three or four years—Had a separate account been taken for each year of all the children under the age of five years—Had the rest of the male and female inhabitants been divided into distinct classes from the age of 5 to 10 years—from the age of 10 to 15 years, and so on for every five years to the extremity of life;—not only would the actual state of the population have been obtained, but also such further information in political arithmetic as would have been highly important to this country. It is to be hoped, therefore, if another survey should ever take place (and I am sure the necessity of it is not lessened by the late costly attempt) that those who shall have the management of it will recollect, that in order to ascertain the real state of the population of the country, a more complicated process is necessary than the mere enumeration of its inhabitants. M.

TWO

ADDITIONAL ESSAYS.

ADDITIONAL ESSAYS.

First Additional Essay.

Observations on the Difference between the Duration of Human Life in Towns and in Country Parishes and Villages.

Read to the Royal Society, June 22, 1775, *and published in the 65th Volume of the* Philosophical Transactions, Part II.

THIS Society has lately been much obliged to Dr. *Percival*, for the accounts he has communicated of the state of population in *Manchester* and other adjacent places[a]. These accounts contain some facts, which appear to me curious and important. From the

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[a] See *Philosophical Transactions*, vol. lxv. p. 322, and vol. lxiv. p. 57.

The particulars of the surveys here referred to are the following.——According to a survey executed with great care the last in particular, there appears to be reason for concluding, that whereas a 28th part of the inhabitants die annually in the town of *Manchester*, not more than a 56th part die annually in the adjacent country. This implies a difference so great between the rates of human mortality in these different situations, that some, whose judgments I reverence, have thought it incredible. I will, therefore, beg leave to offer the following observations on this subject.

care there were, in the summer of 1773, in the town of

Manchester,		*Salford,*
3402	Houses	866
5317	Families	1099
10548	Males	2248
11938	Females	2517
7724	Married	1775
432	Widowers	89
1064	Widows	149
7782	Under 15	1785
3252	Above 50	640
342	Male Lodgers	18
150	Female Lodgers	13
44	Empty houses	26

According to a survey in 1774 there were in the parish of *Manchester*, containing thirty-one townships, exclusive of the towns of *Manchester* and *Salford*,

Tenanted Houses	2371	Under 15	5545
Families	2525	Above 50	1762
Inhabitants	13786	Above 60	470
Males	6942	Above 70	261
Females	6844	Above 80	87
Married	4319	Male Lodgers	68
Widowers	232	Female Lodgers	51
Widows	315	Empty houses	41

In the first place, the evidence in this instance is such as seems to leave little room for doubt. From an accurate survey it appears, that the number of inhabitants in the town was 27,246 in the year 1773. The number of deaths the same year (and also the average for 1772, 1773, and 1774), was 973[b]; that is, a 28th part of the number of inhabitants. From an equally careful survey it appears, that the number of inhabitants in that part of the parish of *Manchester* which lies in the country, was 13,786. The number of deaths in 1772 was 246; that is, a 56th part of the number of inhabitants. The chief objection to this evidence is, that the number of deaths in that part of the parish which lies in the country is given only for one year; whereas the average of several years ought to be given. But first, the number of deaths in 1772, in the town, was nearly the same with the medium for seven years; and from hence there

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[b] The number of burials in the town, including the addition of 50 every year for Dissenters, was, in

1772,	954
1773,	973
1774,	1008

Within the parish, but out of the town, there are 13 episcopal and dissenting chapels; and the number of burials in all these chapels, in 1772, was 246. The christenings were 401. The number of burials brought from the country into the town is not considerable; and it is, I am informed, pretty exactly balanced by the burials carried out of the town into the country.

arises a probability, that in the adjacent country, the number of deaths, in the same year, could not have been much lower than the medium. Secondly, supposing it lower, there is the highest probability, that it was not more than a 4th or 5th lower. Suppose then the true annual medium to be 300, instead of 246, and it will follow, that whereas a 28th part of the inhabitants die in the town annually, a 46th part die in the country; and this is a difference very considerable. But farther, I would observe, that the difference which this survey gives between the rate of mortality in the town of *Manchester* and the adjacent country, is confirmed by a variety of other accounts. It may be stated in general, that whereas in great towns, the proportion of inhabitants dying annually is from 1 in 19 to 1 in 22 or 23, and in moderate towns from 1 in 24 to 1 in 28 [c]; in country parishes and villages, on the contrary, this proportion seldom exceeds 1 in 40 to 50. The proofs of this are numerous and unexceptionable; and I have elsewhere given a particular account of them. I will here only mention the following facts.

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[c] The number dying annually in towns is seldom so low as 1 in 28, except in consequence of a rapid increase produced by an influx of people, at those periods of life when the fewest die. This is the case at *Manchester*. It is also the case at *Liverpool* and at *Berlin*; in the former of which towns, 1 in 27 dies annually; and in the latter, 1 in 26½ died from 1755 to 1759. See Essay I. in this Volume, page 23—69.

The number of inhabitants at *Stockholm* in 1763 was 72,979. The average of deaths for the six preceding years had been 3802 [d]. One, therefore, in nineteen died there annually.

At *Rome*, an account is taken every year of the number of inhabitants; and, in the year 1771, it was 159,675. The average of deaths for ten years had been 7367. One, therefore, in 21⅔ died annually.

In *London* I have shewn, with an evidence which I think little short of demonstration, that at least 1 in 20¾ of the inhabitants die annually [e]. And, from a particular survey and a very accurate register of mortality at *Northampton*, it appears, that 1 in $26\frac{1}{4}$ die there annually.

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[d] See a Memoir by M. *Wargentin*, in the 15th volume of the *Collection Academique*, printed at *Paris*, 1772. From this memoir I learn, that in 1757, and 1760, and 1763, a survey was made of the inhabitants of *Sweden*, distinguishing, particularly, the numbers of both sexes living at every age; and that also, for nine years (or from 1755 to 1763), an exact Register was kept of the number of births and burials in each year, distinguishing the age and sex of every one that died. The result, as given by M. *Wargentin* in this Memoir, contains indeed a most curious account of the state of population in *Sweden*; and it is particularly to my present purpose to mention, that it shews, that though a 19th part of the inhabitants of *Stockholm* die every year, yet in the whole kingdom, taking all the towns and country together, not more than a 35th part die every year. In 1757, *Sweden* consisted of 1,101,595 males, and 1,221,600 females; in 1760, of 1,121,053 males, and 1,246,445 females; and in 1763, of 1,165,489 males, and 1,280,905 females. The annual average of births, from 1755 to 1763, was 46,223 males, and 44,017 females; of marriages, 21,219; of deaths, 34,088 males, and 35,037 females.

[e] See Essay I. in this Volume, p. 40, &c.

Let these facts be compared with the following. In 1767, a survey was made of the inhabitants of the island of *Madeira*, under the direction of Dr. *Thomas Heberden*, and their number was found to be 64,614. The average of burials for eight preceding years had been 1293. Only 1 in 50, therefore, of the inhabitants died annually (see *Philosophical Transactions*, vol. lvii. p. 461.)

The district of *Vaud*, in *Switzerland*, in 1766, contained 112,951 inhabitants. The average of deaths for ten preceding years had been 2504. Only 1 in 45, therefore, died annually[f].

The number of inhabitants in the parish of *Ackworth*, in the county of *York*, in 1757, was 603; and the average of deaths for ten years had been $10\frac{7}{10}$, or a 56th part. In 1767, the inhabitants were increased to 728; and the annual average of deaths was $15\frac{1}{10}$, or nearly a 47th part[g].

The reason of this striking difference between the rate of human mortality in towns and in country parishes and villages must be; first, the luxury and the irregular modes of life which prevail in towns; and, secondly, the foulness of the air. But it has been inquired, whether the migrations of people from the country to towns may not produce this difference, by lessening the proportion of inhabitants that die in the country, and increasing the same proportion in towns? In answer to this inquiry I would observe; first, that this difference being a difference of near a half, it is apparently much greater than can be accounted for by any such cause. But, secondly, it should be considered, that if migrations lessen the number of deaths, they also lessen the number of inhabitants; and that it depends entirely on the ages at which the inhabitants remove from a place, whether the effect of their removal shall be lowering or raising the proportion of the annual deaths to the number of inhabitants. In the present case, the truth appears to be, that the most common age of migration from the country is such as raises this proportion in the country. This will be evident from the following considerations. The period of life in which persons remove from the country to settle in towns is chiefly the beginning of mature life, or from the age of 10 or 15 to 25 or 30. Towns, therefore, will be inhabited more by people in the firmest parts of life; and, on the other hand, the country will be inhabited more by people in the weakest parts of life; and the consequence of this is, that in the country, the inhabitants must die faster in proportion to their number than they otherwise would, and that in towns they must die more slowly. In particular, the number of children is always much greater in the country than in towns; and this is a circumstance which must be extremely unfavourable to the former: for it is well known, that there are no years of life, in which so many die as the first three or four years. Till the age of five, human life, like a fire beginning to burn, is very feeble; and in some situations more than half, and in others, a third or fourth of all that are born die before that age. After this, life grows less and less precarious till it acquires its utmost vigour at 10 or 12; and of the living at this age, not above 1 in 70 or 80 dies annually in the worst situations; and in the best situations, not above 1 in 150 or 160. After 15, life declines, and continues to do so more and more, till it becomes quite extinct in old age. If therefore, in any situation, the inhabitants consist more of persons in mature life, and yet die faster, it must be owing to some particular causes of mortality that operate there. This is the case in all towns where any observations have been made. *Manchester*, in particular, is not only kept up, but increases fast, by removals to it of persons in the prime of life. The country round it increases likewise; but it is by an excess of the births above the deaths; that is, by accessions to it of children in the very feeblest part of life. This ought to raise the proportion of annual deaths to inhabitants in the country, much above the same proportion in the town; but, instead of this, it is near one-half lower.

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[f] See M. *Muret's* Memoir on the State of Population, in the *Pays de Vaud*, printed at *Bern*, in 1766.

[g] I owe this information concerning the parish of *Ackworth* to a curious Register kept there by Dr. *Lee*. I have taken the liberty to insert this register in the Postscript, together with the annual register and survey at *Rome* from 1762 to 1771.

It may be needless to add any thing to these observations.

In order, however, to put this matter out of all doubt, I will observe farther, that it appears in fact, from the accounts furnished by Dr. *Percival,* that the number of inhabitants in the period of life when mankind die fastest[h] (that is in the first and last stages of life), is considerably less in the town of *Manchester* than in the adjacent country. The number of inhabitants in the town under 15 and above 50, is 13,467; in the country, 7305. And the whole number is, in the town, 27,246; in the country, 13,786. In the town, therefore, the inhabitants, in the first and last stages of life, do not make half the whole number; but in the country they make considerably more than half. At *Ackworth*, likewise in *Yorkshire*, the inhabitants under 15 and above 50 are more than half the whole number; and the same is true at *Hale* near *Altringham*; at *Harwich*; at *Darwent*, near *Blackburn*, in *Lancashire*; and at *Cockey Moor*[1], near *Bolton*,

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[h] In towns, about a fourth of the inhabitants die commonly between 14 and 51; a fifth or sixth die at 51 and upwards; and the remainder die under 15. In country parishes and villages about a fifth die between 14 and 51; about two-fifths at 51 and upwards; and the remainder under 15.

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[1] I am much indebted to Dr. *Percival* for the following account of these places. The society belonging to the chapel at *Hale* is composed of 140 males, 136 females, 92 married persons, 8 widowers, 12 widows, 105 under 15, and 41 above 50. The deaths, during seven years, have been 28, and the births 68. Mr. *[illegible]*'s congregation at *Harwich*, consists of 305 individuals; viz. 149 males, 156 females, 94 married persons, 9 widowers, 8 widows, 127 under 15 years of age, and 50 above 50. The births, for seven years, 101; the deaths 32. A 66th part, therefore, die annually in both these places. The Rev. Mr. *Smalley's* congregation at *Darwent*, consists of 1850 individuals; viz. 900 males, 950 females, 640 married persons, 30 widowers, 48 widows, 737 persons under the age of 15, and 218 above 50. During the last seven years the births have amounted to 508, the deaths to 233. A 56th part, therefore die annually. Mr. *Barnes's* congregation at *Cockey Moor*, consists of 154 families and 711 individuals; namely, 320 males, 391 females, 248 married persons, 10 widowers, 27 widows, 252 persons under the age of 15, and 99 above 50. Deaths in seven years 114; in which period the deaths were considerably increased by an uncommon fatality of the small-pox. One person in 44 died annually. The Rev. Mr. *Mercer's* congregation at *Chowbent* in *Lancashire*, consists of 1160 persons; viz. 554 males, 606 females, 173 males and 150 females under the age of ten, 83 males and 91 females above 50, 398 married persons, 20 widowers, and 43 widows. The baptisms during six years, wanting six weeks, have amounted to 293, and the deaths to 169. One person, therefore, in 41 died annually. These surveys were made in the year 1773.—In August 1774 the inhabitants of *Tattenhall* and *Waverton* (two parishes in the

Bolton, in the same county; and yet in some of these places it appears, that not a 60th part of the inhabitants die annually.

At *Stockholm*, in 1763, the inhabitants under the age of 5 were only a 12th; above 70, only a 46th part of the whole number. But in all *Sweden*, the number under 5 was a 7th; and above 70, near the 32d part of all the inhabitants: and yet 35

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the neighbourhood of *Chester*) were surveyed. The former consisted of 382 males and 389 females, of whom 462 were above 14 years of age. The latter contained 310 males and 322 females, of whom 406 were above 14 years of age.——At *Tattenhall* the annual average of christenings, for 10 years ending in 1773, had been 28; of burials, 13.——At *Waverton* the same average had been 19$\frac{8}{10}$ and 8$\frac{4}{10}$.—In the former parish, therefore, a 60th part of the inhabitants, and in the latter a 75th part had died annually.——In 1775 the town and parish of *Ashton under Line*. (distant 8 miles from *Manchester*, and consisting of manufacturers and farmers) were surveyed. The number of inhabitants was 5097, of whom 2534 were males, and 2513 females; 1679 were married; and their ages were, under five, 896—from 5 to 10, 764—from 10 to 20, 1011—from 20 to 50, 1882—from 50 to 70, 471—from 70 to 90, 73. Of these 2700 at least, or more than half, must have been under 15, and above 50.—See a communication of Dr. *Percival's* in the Philosophical Transactions, vol. lxvi. p. 160.

I will add here that, according to an accurate survey communicated to me by one of the gentlemen concerned in making it, of the township of *Leeds*, in *Yorkshire*, it consisted (in 1775) of 15,216 inhabitants in the town, and 1905 inhabitants in the villages and country near the town. The number of males was 8112; of females 9009; of whom 6309 were married; 724 were widows, and 417 widowers; 1333 were females, and 861 males above 20 who had never married; and 3765 were girls, and 3712 boys under 20.

die in the town to 19 in the whole kingdom. This may be easily deduced from Table I. in the Postscript, page 233.

To the accounts which give the proportion of inhabitants to annual deaths so high as 50 or 60 to 1, it has been farther objected, that if true, it must follow, that in such situations half the inhabitants must live to 50 or 60 years of age. But were this a right inference, there would be nothing in it incredible. For though in most cities one-half die in the first two or three years after birth; yet, in many country situations, the greater part live to marry: and in the parish of *Ackworth*, particularly, it appears with undeniable evidence from the Register, that one-half of all born there live to the age of 46. It appears also, with equal evidence, from M. *Muret's* Tables in the *Bern* Memoirs for 1766, that in 43 parishes in the district of *Vaud*, one-half of all born there live beyond the age of 41. In truth, did all mankind lead natural and virtuous lives, that waste of the species which happens in infancy and childhood would not take place, and few would die except in old age. The inference, however, which I have mentioned, cannot be made with reason. It is just only in the particular case of an uniform decrease in the probabilities of living from birth to old age; and this is a case that has never existed. In all other cases, there is not any necessary connexion between the proportion of inhabitants dying annually, and the age to which the greater part live. In most cities one-half, as I have just observed, of all that are born die before two or three years of age. But it cannot be imagined, that there is any place where so many as one-half or a third of the inhabitants die every year.

But to return to Dr. *Percival's* account of the town and parish of *Manchester*. It appears from this account, that the number of children under 15 compared with the number of inhabitants between 14 and 51, is greater in the country than in the town of *Manchester*, in the proportion of no less than 5 to 4[k]. It follows, therefore, that though in consequence of a constant influx of people to the town, it is more filled than the country with inhabitants in the most vigorous periods of life; yet one child in four less is born in the town than in the country. This is a remarkable circumstance, and the reasons of it must be the two following. First, the town inhabitants being less healthy, and dying faster, have not the same strength of constitution with the country inhabitants. Secondly, in the town a

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[k] In the town the number of inhabitants between 14 and 51 is 13,779; and 9575 under 15. In the country the former number is 6481; and the latter, 5545. But the last number would have been only 4503, had the proportion of the inhabitants between 14 and 51 to the inhabitants under 15 been the same in both situations. It is owing to this, that the number of persons in a family in the country is 5½; but in the town only 4¾.

smaller

smaller proportion of the adult inhabitants marry; and they marry later than in the country. The survey fully proves this; for it appears, that though the number of inhabitants at the most common marrying ages, compared with the whole number of the living above the age of 14, is smaller in the country than the town; yet the proportion of the married to the living above 14, is very nearly the same in both situations. And there are more widows and widowers in the town than in the country in the proportion of near 16 to 11. We learn from hence, I think, clearly, in what manner towns operate in checking population, and preventing the increase of mankind.

Dr. *Percival* informs us, that the reverend and learned Dr. *Tucker* has been led, by some observations he has made at *Bristol*, to doubt whether the common opinion is right, with respect to the disproportion between the number of male and female births; and that he, therefore, wishes a farther inquiry may be made into this subject. This has induced me to collect the following facts, which, I think, will abundantly settle this point.

	Born Males.	Females.	Proportion.
In *London* for the last 110 years, or from 1664 to 1773	862293	817072	20 to 19
Paris, for 8 years,[1]	79693	76481	25 to 24

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[1] See *Susm. Gottlicke* Ordnung Tables, p. 16.

Leyden,

	Born Males.	Females.	Proportion.
Leyden, for 50 years,[m] ...	46773	44933	26 to 25
Vienna, for 27 years, ending 1746[n]	67060	64893	31 to 30
Berlin, for 40 years, ending 1761[o]...............	71188	67431	20 to 19
Kurmark of *Brandenburgh*, for nine years, ending 1759[p]	102425	96521	18 to 17
Dukedom of *Magdeburgh*, for 38 years, ending 1759[q]	153227	145985	21 to 20
All the *Prussian* towns, for a course of years,[r]	691826	659072	21 to 20
In a great number of country parishes, for a course of years,[s]	59067	56282	21 to 20
In the same country parishes, for another period of years,[t]	89530	84954	19 to 18
Leeds, *Manchester*, *Coventry*, &c. for a period of years,[u]	108784	103449	20 to 19
In the same towns, for another period[x]	57084	54128	20 to 19
Total	2388950	2271201	20 to 19
Sweden, for 9 years, ending 1763, ...	416007	396124	20 to 19

Mr. *Derham*, in his Physico-Theology, p. 175, has stated the proportion of male to female births at 14 to 13, and this proportion has ever since been generally received as the true one; but it appears from this Table, that it ought to have been stated at 20 to 19. But though it appears that the number of males born is in this proportion greater than the number of females born, yet, in most places, the number of males living has been found to be less than the number of females. The reason is, without doubt, that males are more short-lived than females; and this owing partly to the peculiar hazards to which males are subject, and their more irregular modes of life; but it is owing principally to some particular delicacy in the male constitution which renders it less durable: For there are many observations which prove, that the greater mortality of males takes place chiefly in the first and last stages of life. A few facts of this kind I will beg leave to mention, because I have just met with them.

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[m] See *Susm. Gottlicke* Ordnung Tables, p. 17.
[n] Ibid. p. 13. [o] Ibid. p. 12. [p] Ibid. p. 3.
[q] Ibid. p. 5. [r] Ibid. p. 9.
[s] See Dr. *Short's* New Observations, p. 27, 31.
[t] Ibid. p. 30. [u] Ibid. p. 49. [x] Ibid.

In the parish of St. *Sulpice*, at *Paris*, during 30 years, 5 males under a year old died to 4 females. But under 10, only 13 males died to 12 females (see *Susmilch.* Tables, vol. II. p. 30).

In *Stockholm*, during 9 years ending in 1763, the number of still-borns amounted to 666; of whom 390 were males, and 276 females; that is, 10 to 7. The number of the living in that city above the age of 80 was, in 1760, 332; of whom 248 were females, and 84 males, or near 3 to 1. In the whole kingdom of *Sweden*, including all town and country inhabitants, the number of still-borns, during the 9 years just mentioned, was 19,845; of whom 11,424 were males, and 8421 females, or near 4 to 3. The number of the living in the whole kingdom consisted of more females than males, in the proportion of 10 to 9. It consisted of more females turned of 80 than males, in the proportion of 33 to 19; and of more females turned of 90 than males in the proportion of near 2 to 1. See a Memoir of M. *Wargentin's* in the *Memoires abreges de l'Academie Royale des Sciences de Stockholm,* printed at *Paris* in 1772, p. 21. Having now had occasion to refer again to this Memoir, I will just add, that it appears, that by the excess of the births above the deaths, *Sweden* gains every year an addition of above 20,000 inhabitants; and that in 6 years they increased from 2,323,195 to 2,446,394. I am afraid, were regulations established for a similar inquiry in this kingdom, we should be far from finding our state so encouraging. *London* alone is a gulph which probably swallows up an increase equal to almost the whole increase[y] of *Sweden.*

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[y] This is meant on a supposition which, I think, not extravagant, that the annual supply of people in mature life from the country, to keep up *London* and its environs, is 10,000. In order to provide this supply there must be about double that number born in the country.

POSTSCRIPT.

POSTSCRIPT.

THE following Tables have been selected from several more of the same kind in M. *Wargentin's* Memoir on the state of population in *Sweden.* I have inserted them here, because they fully verify most of the observations in the preceding paper, and contain more distinct and authentic information on the subject of human mortality than I have ever before met with.

TABLE

TABLE I.

Shewing the Rate of human Mortality in *Sweden.*

	Annual deaths, being the average of three years, 1761, 1762, & 1763.		Number of the living in 1763.		
	Males.	Femal.		Males.	Females.
Still-born........	1324	988	Born	47216	44892
Died under 1	11172	9850	Living under 1	36094	35453
Died between 1 & 3	4393	4336	Living betn. 1 & 3	66059	67234
3— 5	2206	2249	3— 5	66454	67711
5—10	2151	2057	5—10	130019	130758
10—15	933	834	10—15	126696	128021
15—20	711	658	15—20	108312	109985
20—25	834	756	20—25	92299	105115
25—30	883	863	25—30	88056	101003
30—35	1020	1146	30—35	85936	95811
35—40	955	923	35—40	74826	81453
40—45	1180	1170	40—45	67448	74854
45—50	1099	938	45—50	52398	59551
50—55	1280	1113	50—55	47298	56646
55—60	1177	1097	55—60	37086	45537
60—65	1586	1721	60—65	34892	44925
65—70	1237	1566	65—70	20649	28964
70—75	1322	2041	70—75	15454	23159
75—80	1092	1695	75—80	8858	13556
80—85	917	1446	80—85	4620	7487
85—90	414	650	85—90	1508	2694
Above 90	215	379	Above 90	527	988
Total of annual Deaths,	36777	37488	Total of living at all ages,	1165489	1280905

In this Table it is observable, that the number of the living, in every equal division of life from birth, decreases continually till all become extinct; and that though the males born are more than the females born, in the proportion of 20 to 19; yet the males living of all ages are less in number, in the proportion of 1,165,489 to 1,280,905, or nearly of 10 to 11; notwithstanding which, the males that die annually are to the females as 52 to 53.

TABLE II.

Shewing the Rate of human Mortality at *Stockholm.*

	Annual deaths, being the average of three years, 1761, 1762, & 1763.		Number of the living in 1763.		
	Males.	Femal.		Males.	Females.
Still-born	54	43	Born	1406	1340
Died under 1	567	489	Living under 1	684	733
Died betwn. 1 & 3	161	170	Living betn. 1 & 2	1173	1348
3— 5	80	79	3— 5	1022	1106
5—10	71	72	5—10	2630	2774
10—15	49	24	10—15	3151	2918
15—20	53	30	15—20	3018	2865
20—25	91	64	20—25	3070	4056
25—30	121	78	25—30	3380	4251
30—35	141	102	30—35	3705	4234
35—40	118	96	35—40	3019	3288
40—45	140	115	40—45	2846	3130
45—50	101	84	45—50	1775	1984
50—55	105	91	50—55	1581	2129
55—60	61	54	55—60	853	1329
60—65	79	88	60—65	826	1383
65—70	41	54	65—70	370	778
70—75	33	77	70—75	260	574
75—80	28	59	75—80	128	324
80—85	18	45	80—85	58	127
85—90	7	20	85—90	16	51
Above 90	3	11	Above 90	10	22
Total of annual deaths,	2068	1902	Total of living at all ages,	33575	39404

In this Table it may be observed, that the number living at every age from birth decreases only till five. Between 5 and 10 *Stockholm* begins to receive recruits from the country, and they come in faster and faster till 35; after which age it appears, that more die than come in; and that the living in every subsequent period goes on decreasing continually till the end of life. It is farther observable, that this Table exhibits a greater difference than the former, between the mortality of males and females.

A comparison of these Tables will shew a striking contrast in other respects between the state of human mortality in the whole kingdom of *Sweden* and in its capital. In order to make this more obvious and unexceptionable, I will add the following Table, deduced from all M. *Wargentin's* Tables taken together.

TABLE III.

	In all *Sweden* for nine years.		In *Stockholm* for 9 years.	
	Male .	Females.	Males.	Females.
Still born	1 in 36	1 in 47	1 in 32	1 in $43\frac{1}{2}$
Died under 1 of all born,	1 in $4\frac{1}{3}$	1 in $4\frac{4}{5}$	1 in $2\frac{1}{3}$	1 in $2\frac{3}{10}$
Died annually of the living betwn. 1 & 3	1 in $17\frac{1}{3}$	1 in $17\frac{3}{4}$	1 in 7	1 in $7\frac{1}{3}$
Between......3—5	1 in $34\frac{1}{2}$	1 in 36	1 in $13\frac{1}{3}$	1 in 16
5—10	1 in 71	1 in 76	1 in $34\frac{1}{2}$	1 in 39
10—15	1 in 149	1 in 161	1 in 79	1 in 114
15—20	1 in 149	1 in 164	1 in 59	1 in 99
20—25	1 in 108	1 in 139	1 in 44	1 in 79
25—30	1 in 98	1 in 113	1 in 33	1 in 58
30—35	1 in 85	1 in 84	1 in 31	1 in 43
35—40	1 in 78	1 in 91	1 in $26\frac{1}{2}$	1 in 39
40—45	1 in 56	1 in 63	1 in 23	1 in 31
45—50	1 in 49	1 in 65	1 in $19\frac{1}{2}$	1 in 28
50—55	1 in 37	1 in 40	1 in $16\frac{1}{2}$	1 in $25\frac{1}{2}$
55—60	1 in 31	1 in 40	1 in 14	1 in 24
60—65	1 in 23	1 in 26	1 in 11	1 in 16
65—70	1 in 17	1 in $18\frac{1}{2}$	1 in $9\frac{1}{2}$	1 in $13\frac{1}{3}$
70—75	1 in $11\frac{1}{3}$	1 in $11\frac{1}{2}$	1 in $7\frac{3}{10}$	1 in 8
75—80	1 in 8	1 in $8\frac{1}{3}$	1 in $4\frac{1}{2}$	1 in 5
80—85	1 in $5\frac{1}{4}$	1 in $5\frac{1}{3}$	1 in $3\frac{1}{2}$	1 in $3\frac{1}{2}$
85—90	1 in $3\frac{1}{3}$	1 in 4	1 in 2	1 in $2\frac{1}{3}$
Above...... 90	1 in $2\frac{1}{2}$	1 in $2\frac{1}{2}$	1 in $3\frac{3}{10}$	1 in $2\frac{1}{3}$
Died of all living at all ages,	1 in $33\frac{1}{2}$	1 in 36	1 in $17\frac{1}{70}$	1 in $21\frac{1}{4}$

A general Bill of all the Christenings and Burials in the Parish of *Ackworth*, in the County of *York*, extracted from the Parish Register, for ten Years, from March 25, 1747, to March 25, 1757.

In ten years christened, Males 62. Females 65. Total, 127.
In ten years buried, Males 58. Females 49. Total, 107.

	Males	Fem.	Tot.		Males	Fem.	Tot.
Whereof have died				And there have died of			
Under 2 years old,	6	11	17	Apoplexy....	0	1	1
Between 2 and 5	1	2	3	Cancer......	1	0	1
5——10	2	2	4	Cholic.......	1	0	1
10——20	1	2	3	Consumptions	10	13	23
20——30	6	2	8	Dropsy......	4	1	5
30——40	2	3	5	Fevers......	23	12	35
40——50	11	3	14	Infants......	6	7	13
50——60	9	2	11	Lunacy.....	0	1	1
60——70	9	7	16	Old age.....	9	15	24
70——80	9	8	17	Palsey.......	1	0	1
80——90	1	6	7	Quinsey.....	0	1	1
90——100	1	1	2	Small-pox...	1	0	1
Of all, in 10 years,	58	49	107	Of the above distempers, in 10 yrs.	56	51	107

In this parish there are { 160 Houses, 12 of which are uninhabited.
603 Souls of the following ages, viz.

	Males	Fem.	Tot.		Males	Fem.	Tot.
Under 2 years old,	12	19	31	Between 40 and 50	40	22	62
Between 2 and 5	25	19	44	50——60	38	33	71
5——10	30	38	68	60——70	25	14	39
10——20	59	58	117	70——80	4	8	12
20——30	55	41	96	80——90	4	0	4
30——40	26	33	59	90——100	0	0	0
				Total of all ages....	318	285	603

A general

A general Bill of all the Christenings and Burials in the Parish of *Ackworth*, in the County of *York*, for 10 years, from March 25, 1757, to March 25, 1767.

In ten years christened, Males 104. Females 108. Total, 212.
In ten years buried, Males 79. Females 77. Total, 156.

	Males	Fem.	Tot.		Males	Fem.	Tot.
Whereof have died				And there have died of			
Under 2 years old,	18	13	31	Apoplexy......	2	1	3
Between 2 and 5	9	7	16	Asthma.......	2	1	3
5——10	4	1	5	Cancer........	0	1	1
10——20	2	2	4	Casualties	5	1	6
20——30	7	5	12	Childbed......	0	2	2
30——40	3	8	11	Chincough.....	0	2	2
40——50	2	4	6	Consumptions..	23	15	38
50——60	11	3	14	Convulsions....	4	2	6
60——70	13	13	26	Diabetes	1	0	1
70——80	7	14	21	Dropsy........	0	3	3
80——90	3	6	9	Dysentery.....	1	1	2
90——100	0	1	1	Fever.........	12	11	23
				Jaundice	1	0	1
Of all ages in 10 yrs	79	77	156	Infants........	7	6	13
				Lunacy.......	0	1	1
				Measles.......	0	2	2
				Mortification...	2	1	3
				Old age.......	11	19	30
				Palsey........	1	0	1
				Quinsey.......	1	0	1
				Small-pox.....	7	6	13
				Teeth	0	1	1
				Of all the above disorders, in 10 years	80	76	156

In this parish there are { 184 Houses, 11 of which are uninhabited.
728 Souls of the following ages, viz.

	Males	Fem.	Tot.		Males	Fem.	Tot.
Under 2 years old,	31	25	56	Between 40 and 50	31	38	69
Between 2 and 5	32	36	68	50——60	28	32	60
5——10	34	38	72	60——70	20	28	48
10——20	50	51	101	70——80	7	10	17
20——30	44	63	107	80——90	2	4	6
30——40	61	62	123	90——100	0	1	1
				Total of all ages.....	339	389	728

In 1702 there were only eleven children baptized, six of whom are now living in the parish, and have resided here almost all the time.

Account of the Inhabitants of Rome, from 1762 to 1771.

-	1762	1763	1764	1765	1766	1767	1768	1769	1770	1771
Parish churches	81	81	81	81	82	82	82	82	82	82
Families	35739	35696	35453	35771	35894	36375	36409	36521	37449	37285
Bishops	42	62	45	45	51	52	54	47	52	62
Priests	2742	2699	2718	2617	2531	2652	2676	2819	3031	2925
Religious of sundry orders	4381	4291	3588	4509	4258	4105	4310	4088	3792	3739
Nuns	1725	1892	1661	1759	1684	1738	1709	1695	1692	1594
Collegians and scholars	868	970	763	888	734	1153	907	1197	939	491
Cardinals courts or attendants	812	791	765	544	827	588	491	592	72	665
Poor pensioners of the hospital	1050	858	1271	1725	1903	2839	2010	1970	1426	1386
Prisoners	339	240	336	402	370	390	251	405	446	402
Males of all ages	90239	87396	88618	87205	88280	88577	88865	88415	86610	87547
Females of all ages	67219	71423	73286	70890	69588	71183	69982	70491	71833	72128
Above 14 years of age	120696	123211	125391	120300	119661	122150	120820	121455	120385	119984
Under 14	36762	35608	36508	37795	38207	37610	38027	37451	38058	39691
Nonconformists to the church of *Rome*	37	61	75	86	120	49	63	77	84	91
Blacks	9	11	8	8	12	5	10	9	5	5
Devotees	18	30	28	31	28	22	20	25	20	20
Births	4989	5336	5420	4828	4962	4310	4595	4891	4967	4216
Deaths	7149	6493	7361	8375	7722	7528	9574	6972	6646	5850
Total of inhabitants	157458	158819	161899	158095	157868	159760	158847	158906	158443	159675

ESSAY II.

Proofs of the Insalubrity of marshy Situations. In a Letter to the Rev. Dr. Horsley, *read to the Royal Society, Jan.* 13, 1774, *and published in the Philosophical Transactions. Vol.* lxiv. p. 96.

Dear Sir,

Dr. *Priestley's* paper on the noxious effects of stagnant waters, read last Thursday to the Royal Society, brought to my remembrance a Table exhibiting the rate of mortality in a parish situated among marshes, which I had seen in Mr. Muret's Observations, published in the Memoirs for 1766 of the Economical Society at *Bern.* I have since examined this Table, and found that it contains a full confirmation of Dr. *Priestley's* assertions. This parish is a part of the district of *Vaud,* belonging to the canton of *Bern,* in *Switzerland,* and contained 169 families, and 696 inhabitants. Mr. Muret's Table of the rate of mortality in it is formed from a register of the ages at which all died in it for 15 years. With this Table he has also given Tables from like registers of the rates of mortality in seven small towns; in 36 country parishes and villages; in 16 parishes situated in the *Alps*; in 12 corn parishes; and in 18 vintage parishes.——From comparing these Tables it appears that the probabilities of living are highest in the most hilly parts of the province, and lowest in the marshy parish just mentioned. The difference is indeed remarkable, as will appear from the following particulars. One half of all born in the mountains live to the age of 47. In the marshy parish, one half live only to the age of 25. In the hills one in 20 of all that are born live to 80. In the marshy parish, only one in 52 reaches this age. In the hills, a person aged 40 has a chance of 80 to 1, for living a year. In the marshy parish, his chance for living a year is not 30 to 1.—In the hills, persons aged 20, 30, and 40, have an even chance for living 41, 33, and 25 years respectively. In the fenny parish, persons, at these ages, have an even chance of living only 30, 28, and 15 years.

I am sensible that observations for only 15 years, in one small parish, do not afford as decisive and ample an authority, in the present case, as there is reason to wish for; and that, therefore, the perfect exactness of the particulars I have recited, cannot be depended on.—They are, however, sufficiently near the truth to demonstrate, in general, the unhealthfulness of a marshy situation; and as the register from which they are derived is the only one, in such a situation, which I have ever met with; and Dr. *Alexander's* experiments may lead some to very wrong concluſions on this subject; I could not help thinking, that there would be no impropriety in sending you the account I have now given. If you think it of any importance, I shall be obliged to you for reading it to the Royal Society.

I cannot help taking this opportunity to add my wishes, that such registers of mortality as those published by Mr. *Muret*, were established in every part of this kingdom. We might then determine immediately every such question as that which has occasioned this letter; and know certainly what influence different airs and different situations have on the duration of life. Two ingenious physicians, Dr. *Percival* at *Manchester*[a], and Dr. *Haygarth* at *Chester*, have lately, with much zeal, promoted institutions of this kind; and a great deal of useful information may be expected from the accurate and comprehensive registers of mortality, which, under their direction, have been established in these towns. But the instruction arising from these establishments cannot be complete, till they become universal.

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[a] Dr. PERCIVAL has not succeeded at *Manchester*. But it has been seen, in the courſe of this work, that I have derived a great deal of information from Dr. *Haygarth's* register. Dec. 1781.

I am, Sir,
Your most obedient
and humble Servant,
RICHARD PRICE.

Newington Green,
Dec. 21, 1778.

GENERAL INTRODUCTION,

CONTAINING

An Account of the NEW TABLES *of the Duration of Human Life at* Chester, Warrington, *the Kingdom of* Sweden, Stockholm, London, &c. *inserted in the following Collection of Tables.*

I HAVE in the second Essay in this Volume, p. 97, and in the Postscript to the 4th Chapter in the preceding Volume, p. 210, given an account of the improvement which was made in the former edition of this work, of the Table of Observations for *Northampton*, and of my reasons for wishing to discard the tables of the values of single and joint lives, founded on Mr. *De Moivre's* hypothesis, and substituting in their room the tables in the following collection.—I was farther enabled to improve this work, in that edition of it, by inserting tables formed from a register of mortality established near twenty years ago at CHESTER.—This register was formed on the plan proposed in the 2d Essay in this Volume, page 111, and, therefore, is more comprehensive than any register of the same kind that has been hitherto established.

Chester is a healthy town, of moderate size, where the births had, for many years, a little exceeded the burials; and the register to which I refer had the particular advantage of being under the direction of Dr. *Haygarth*, its founder[a] as well as conductor. As it gives an accurate account of the distempers of which all the inhabitants die in every season, and at every age, it contains much physical instruction; but my views lead me only to take notice of that part of it which gives the law according to which human life wastes in all its different stages, both among males and females.

A summary of this part of the register is given in the introduction to the CHESTER tables, in the following collection of tables.

Concerning these Tables it is necessary I should make the following observations.

The Table for females must be considered as particularly correct, because the number of females *born* and *buried* in *Chester* are very nearly equal.——On the contrary; the number of males *born* being about an 8th greater than the number *buried*, it follows that, in the table of decrements for males, the number of the living, and consequently the probabilities of living at every age, for at least 10 or 15 of the first years of life, must be given too low.

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[a] This able and ingenious physician has given another proof of his zeal to render his professional character as useful as possible, by instituting a plan, which he has been carrying on at *Chester*, for preventing the spread of the small-pox by infection, and thus gradually exterminating it.

The expectation of a female at birth is, according to these tables, nearly $33\frac{1}{4}$ years; and of a male $28\frac{1}{4}$. The number of females, therefore, at Chester, is to the number of males as $33\frac{1}{4}$ to $28\frac{1}{4}$, or in the proportion of 8000 to 6771, which is the proportion discovered by a survey in 1774, when the females in this city were found to be 8016, and the males 6697[b].

These tables are farther confirmed by the proportion which they give of the number of males and females living under 15 to the whole number. This proportion is by the tables

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[b] It appeared from this survey (made with great care under the direction of Dr. *Haygarth*) that in 1774 there were in the ten parishes of *Chester*, including the suburbs,

Families.	Inhabitants.	Males.	Females.
3428.	14713	6697	8016
Married.	Widowers.	Widows.	Under 15.
4881	258	736	4486
Above 70.	Recovered of the small-pox in 1774.		Dead of the small-pox in 1774.
625	1183		802
Ill of the small-pox in Jan. 1775.			Not had the small-pox in Jan. 1775.
19			1060

tables nearly that of 4486 to 14,888, and the *actual* numbers found by the enumeration in 1774, were 4486 and 14,713.

In like manner; the number of the living above 70 was, by the same survey, found to be 625; and the tables give this number nearly the same.

The expectation at birth, taking males and females together, is at *Chester*, by the tables, near 31; and therefore one in 31 ought to die annually. But the quotient arising from dividing the number of inhabitants (14,713) by 409 (the medium of annual burials from 1772 to 1781), will shew that in reality no more than one in 36 die annually.——The reason of this difference is, first, that the births exceed the burials; and that, consequently, a table which takes the burials for its *radix*, must give the expectations of life too low.——A second reason is, the emigration of males from *Chester*; in consequence of which, though more males than females are born, and though males are also more short-lived; yet fewer die at *Chester*, many dying in the army, navy, militia, &c. The effect of the first of these causes will be particularly exemplified hereafter, in the case of the kingdom of Sweden.

Observations similar to these may be made on the tables in the following collection, formed from a register of mortality at *Warrington* in *Lancashire*, founded and conducted by the ingenious Dr. *Aikin* (then the physician there,) to whose kindness and communicativeness, as well as to Dr. *Haygarth's*, I have been much obliged. See Tables 41st and 42d.

The expectation of a male just born, at WARRINGTON, is, by these tables, 20$\frac{4}{5}$: of a female 25$\frac{1}{5}$; and of males and females taken together, 23$\frac{1}{10}$ nearly.

In the beginning of 1781 Dr. *Aikin* procured an enumeration of the houses and inhabitants in *Warrington* and its vicinity, consisting of the town of *Warrington*, the township as far as the lays are collected, *Poulton, Fearnhead*, and *Woolston*. The number of houses, including 74 uninhabited, was 2000; of inhabitants 9501, or 4$\frac{55}{100}$ to a house.——The number of inhabitants divided by 302 (the annual average of burials for 9 years from 1773 to 1781) gives 31$\frac{2}{5}$, but divided by 321, the annual average of burials for five years, from 1777 to 1781 (which, in this case, seems the fairest average) gives 29$\frac{3}{5}$. There is, therefore, in this town, a greater difference between the proportions dying annually, as determined by enumeration and by calculation from the register, than there is at *Chester*; and the reason is, that the two causes just mentioned operate more here. The births in particular (the annual average of which for the 5 years just mentioned was 411) exceed the burials much more at *Warrington*; and therefore the burials are much more below the true average, and the probabilities of living exhibited by the table of decrements, much more below the true probabilities. Every one must be struck with the difference, in respect of longevity, which these tables exhibit between the inhabitants of *Warrington* and *Chester*; and it will appear more remarkable when it is considered, that about an 8th or 9th of the inhabitants included in the *Warrington* bills, are inhabitants of the country for a mile or two round *Warrington*. ——*Chester* appears, indeed, to be an extraordinary exception to the hurtful effects of towns on the duration of life. The probabilities of living in it, though lower than in country parishes, are considerably higher than in any other city where observations have been made. I am not qualified to explain the causes which give it this distinction. A probable account of them has been given by Dr. *Haygarth*, in a paper printed at *Chester*, and containing *Observations on the Population and Diseases of Chester in* 1774.

It is farther observable, that these tables agree in exhibiting, in a striking light, the difference between the probabilities of living among males and females. But this difference will appear more evidently from the Tables for *Sweden*, of which I am next to give an account.

There are two sorts of *data* for forming tables of the probabilities of the duration of human life at every age. One is furnished by registers of mortality shewing the numbers dying at all ages. The other, by the proportions of deaths at all ages to the numbers living at those ages discovered by surveys or enumerations.——Tables formed from the former of these *data*, are correct only when there is no considerable fluctuation among the inhabitants of a place, and the births and burials are equal. When there are more removals *from* than *to* a place, and the births exceed the burials, as is almost always the case in country parishes and villages, tables so formed give the probabilities of living too low. When the contrary happens, as is generally the case in towns, they give the probabilities of living too high. But tables formed from the latter of these *data*, are subject to no errors. They must be correct, whatever the fluctuations are in a place, and how great soever the inequalities may be between the births and burials.——I know of no observations extant which furnish the means of forming *such* tables, except those published by the late Mr. *Wargentin* in the Memoirs of the Academy of Sciences at STOCKHOLM, in 1776; an abstract of which I have given in the first additional Essay in this volume; and a continuation of which, from 1763 to 1776, Mr. *Wargentin* with the greatest goodness, communicated to me some time before his death. These observations are more curious than any that have been yet published, and leave us little to wish for on this subject, except that similar observations were made in other kingdoms under the direction of men equally able and ingenious with Mr. *Wargentin.*—It is from the result of all these observations taken together, that I have constructed Tables 44th, 45th, &c. in the following collection.

The Tables for Sweden at large, compared with those for Stockholm the capital, confirm, in a very striking manner, all that I have said in this volume, and other parts of this work, of the difference between the duration of life in great towns, and in the country.—They likewise furnish the most indisputable evidence for the shorter duration of the lives of males than of females; and it deserves particular notice, that the tables for *Sweden* at large differ, in this respect, but little from the tables formed from Dr. *Haygarth's* Observations at *Chester.* These observations give sufficient *data* for calculating, with some correctness, distinct tables of the values of lives among males and females, taken separately and conjunctly; but I have preferred for this purpose the Sweden observations, because (as hath been just observed) more correct *in their nature*; and because also (being made on the inhabitants of a whole kingdom for 21 years, and the enumeration which gives them their chief value having been repeated at *seven* different periods) they are much more to be depended on, and must give a juster valuation of lives among mankind at large, including all town and country inhabitants.

I have, for my own satisfaction, constructed tables for SWEDEN and STOCKHOLM from the former of the *data* I have mentioned (or the numbers dying every year in every stage of life, as given by Mr. *Wargentin*); but being afraid of crowding this volume too much with tables, I have not inserted them. The reader, if he chuses to make such tables for himself, is furnished with sufficient means of doing it in the first Essay in the beginning of this volume: and he will find, on comparing them with Tables 44th, &c. all the errors exemplified arising from the common methods of constructing tables of observation. In particular; he will find that though it appears from the tables for *Sweden* in the following collection, that the *true* expectation of a child just born in that kingdom, taking males and females together, is $35\frac{1}{10}$; yet, a table formed from the numbers dying in every stage of life in the method described in the second Essay in this Volume, will, (in consequence of the births exceeding the burials near a *third* of the burials) give this expectation only 25 years and three quarters; in connexion with which, he will also find, that in all the first stages of life it gives the probabilities of living much too low.

I must add, that such a table formed for *Stockholm*, and compared with the correct table (or Table 46th), will exhibit all the errors in the common tables for *London*, described in the Essay just referred to[c].

For

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[*] In a table thus constructed (that is, on the supposition that all who die at *Stockholm* were born there) the numbers in the column of the living will be,

		Males.	Females.
at age	0	10,000	10,000
	1	7,082	7,260
	2	6,522	6,648
	5	5,699	5,809
	10	5,302	5,422
	15	5,108	5,290
	19	4,915	5,180
	20	4,865	5,145
	25	4,480	4,854
	30	3,958	4,440
	40	2,807	3,498
	50	1,796	2,629
	60	1,066	1,918
	70	478	1,171
	80	133	412
	85	53	179
	90	15	39
Totals, including the numbers omitted..........		242,100	285,367

These totals divided by 10,000, and the quotients diminished by half unity, give 23.71 the expectation of a *male* at birth in *Stockholm*, and 28 the expectation of a female. The expectation, therefore, at birth of males and females conjointly, is, by this table, 25.85 (or 25⅘) which agrees almost exactly with the expectation at birth

by

For instance. According to the correct table, the expectation of a male at birth in *Stockholm* is only $14\frac{1}{4}$; and of a female 18. But in a table formed from the deaths only, in the same manner with Table 13th for *London*, the former expectation comes out no less than $23\frac{3}{4}$, and the latter 28.——Again. The correct table makes 62 hundredths die annually of the males living between birth

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by a table formed in the same manner for *London*. See Essay II. p. 82, and Table 13th, in the following collection.——It deserves particular notice, that there is a like agreement between these tables at every age between birth and the utmost extent of life, as will sufficiently appear from the following comparison.

EXPECTATIONS of males and females conjointly, by a table of observations constructed from the bills, on the supposition that all who *die* were *born*.

	at STOCKHOLM.		at LONDON.
Age 10	$36\frac{4}{5}$	—	37
20	29	—	$29\frac{1}{3}$
30	$23\frac{1}{3}$	—	$24\frac{1}{10}$
40	$19\frac{4}{5}$	—	$19\frac{1}{2}$
50	$15\frac{4}{5}$	—	$15\frac{7}{10}$
60	$11\frac{3}{5}$	—	$11\frac{7}{10}$
70	$7\frac{3}{4}$	—	8

With these expectations compare the true expectations at *Stockholm*, deduced from Table 44th.

Age 10	$33\frac{3}{5}$
20	$26\frac{2}{5}$
30	$22\frac{1}{5}$
40	$17\frac{1}{3}$
50	$13\frac{1}{3}$
60	$9\frac{1}{4}$
70	$5\frac{4}{5}$

and five years of age; one in $3\frac{1}{2}$ of the males living between 5 and 10; one in 65, between 8 and 16; one in 69, between 10 and 20; one in 40, between 20 and 30; one in $29\frac{1}{2}$ between 30 and 40; one in 22, between 40 and 50; one in 16, between 50 and 60; one in 11, between 60 and 70; and one in 7 between 70 and 80. But the other table, would make only 43 hundredths die between birth and five years of age; one in 70, between 5 and 10; one in 120, between 8 and 16; one in 117, between 10 and 20; one in 50, between 20 and 30; one in 30, between 30 and 40; one in 23, between 40 and 50; one in $18\frac{1}{2}$, between 50 and 60; one in $13\frac{1}{2}$, between 60 and 70; and one in 9 between 70 and 80.

Of FEMALES, the *correct* table makes fifty-nine hundredths die annually of the living between birth and five years of age; one in $3\frac{9}{10}$ of the living between 5 and 10; one in 90, between 8 and 16; one in 107, between 10 and 20; one in 68, between 20 and 30; one in 41, between 30 and 40; one in 30, between 40 and 50; one in $24\frac{1}{2}$, between 50 and 60; one in 15, between 60 and 70; and one in $7\frac{1}{2}$, between 70 and 80. But the other table would make only forty-two hundredths [d] of females die between birth and five years of age; one in 72, between 5 and 10; one in 180, between 8 and 16; one in 191, between 10 and 20; one in 70, between 20 and 30; one in 42, between 30 and 40; one in 35, between 40 and 50; one in 32, between 50 and 60; one in 21, between 60 and 70; and one in 10½, between 70 and 80.

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[d] Compare the last note with the correct Table, or Table 46th.

Farther. The correct table makes the number of inhabitants (taking males and females together) dying annually at *Stockholm*, to be nearly a 16th and a half. The other would make it a 26th part of the inhabitants; whereas the number actually dying is nearly a 19th.——The former table gives this proportion too great, because, in consequence of giving the true order in which a given number born will die, it gives only the expectation at *birth* in *Stockholm*;* and therefore, cannot include the expectation at *entrance* of those who begin their residence in *Stockholm* after infancy.——The other must give this proportion too little, for the reasons explained in the 2d Essay, p. 82, &c.

In order to make a table constructed for *Stockholm* in the manner mentioned in the note p. 255, a just representation of the inhabitants, the numbers of the living (the decrements continuing the same) should be diminished at *every* age by a number equal to the annual average of new-comers at and after that age. After this diminution, the table will exhibit the same probabilities of life at every age with Table 16th; and if the sum of the remaining numbers is divided by the sum of the decrements, the quotient lessened by half unity will, agreeably to the rule in p. 86 of this Volume, give the number which I have called the *expectation of entrance*, and consequently the true proportion of inhabitants dying annually.—But there being no observations which make a subtraction of this kind at every particular age practicable; it is necessary to be satisfied with such a subtraction at the beginning of mature life as that directed in the 2d Essay, p. 84, &c. —The *Stockholm* observations happily give a proof of the necessity and use of this subtraction, by informing us of the *true* probabilities of living at *Stockholm*, as exhibited in Table 16th; and at the same time furnishing us with the means of constructing a table (like the 14th for *London*) of the probabilities of living in this town, on the supposition that all who die were born there. Let therefore, (since the excess of the burials above the births is nearly the same[†] in both cities) the correction be applied to this last table which has been applied to Table 18th for *London*. That is; let it be supposed that one quarter of all males and females who die at *Stockholm*, begin their residence in their 20th year; and in conformity to this supposition, let 2500, or a quarter of the *radix*, be subtracted from all the numbers living at every age before 20, preserving the decrements the same. The result will be a table which, when compared with Table 46th, will appear to exhibit more nearly the true probabilities of living in all the stages of life. By giving them, however, too high, it will appear that the correction has not been sufficient; and that,

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* And this too on the supposition, that the probabilities of living, at every particular age, among the inhabitants born in *Stockholm*, are the same that they are among the whole body of inhabitants at that age, consisting of *natives* and *foreigners*; whereas the truth is, that the mortality of great towns falls more on the new comers, than on those who have been seasoned to it by having lived in it some time.

[†] In nine years, before 1764; the births at *Stockholm*, exclusive of the still-born, were 7,907, and the burials 11,344.

After this correction, the numbers in the table, p. 258, will be

		Living.			Living.
Males at age	0	7,500	Females at age	0	7,500
	1	[illegible]		1	5,760
	2	4,022		2	4,148
	5	3,199		5	3,309
	10	2,802		10	2,909
	15	2,608		15	2,790
	19	2,416		19	2,680
	20	4,865		20	5,145
	25	4,480		25	4,854
	&c.	&c.		&c.	&c.
Totals (including the numbers omitted) after deducting 5000		187,100			220,367

Therefore the expectation at entrance of males is 18[illegible], of *females* is 23[illegible]; of both conjointly $20\frac{87}{100}$; but these expectations are really (as appears from the observations) 16.80 —— 20.93; and 18.89 respectively.

consequently

consequently, the expectation at entrance will come out, though much *nearer*, yet still *above* the truth.

I have thought it worth while to make these observations, in order to shew, from an unquestionable fact, what judgment ought to be formed of the tables for *London* in the following collection; and it seems impossible not to be convinced by them that though these tables give the probabilities of the duration of life in *London* (and consequently the values of life-annuities) strikingly lower than in other situations, yet they do not give them low enough; and that, in particular, the number by which the annual deaths ought to be multiplied to find the number of inhabitants, and which Table 14th determines to be 20¼, is not probably so much as 20.

In short. From the agreement in almost every particular between the *London* and *Stockholm* bills, and between two tables formed on the same principles from the deaths *only* in both towns, it seems a necessary conclusion that, since one of these tables (even after the correction explained in the fourth essay) gives certainly too favourable a representation of human life, the other must do the same.

The following fact has some tendency to confirm this conclusion.

It appears from the midwifery reports of the general *Westminster* Infirmary, that of

1618 married men, and 1618 married women, examined by Dr. *Bland* the physician to this Infirmary, only 329 of the *men* and 495 of the *women*, had been born in *London*;[h] that is, a *fifth* of the men, and somewhat more than a *quarter* of the women. But the correction I have been considering implies, that a number equal to *half* of all turned of 20 in *London*, are natives of *London*; and therefore, if we may judge at all from this fact, it must be an insufficient correction.

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[h] See Dr. *Bland's* account in the Philosophical Transactions, Vol. 71st, Part II. p. 370.——Of the whole number (3236) four-sevenths, or 1870, were born in the different counties of *England* and *Wales*; 209 in *Scotland*; 280 in *Ireland*; and 58 were foreigners.

TABLE I.

The present Value of £1 to be received at the End of any Number of Years, not exceeding 100;

Years.	2 per cent	2½ per cent	3 per cent	3½ per cent	4 per cent	4½ per cent
1	.980392	.975609	.970874	.966184	.961538	.956938
2	.961168	.951814	.942596	.933511	.924556	.915730
3	.942322	.928599	.915142	.901943	.888996	.876297
4	.923845	.905950	.888487	.871442	.854804	.838561
5	.905731	.883854	.862609	.841973	.821927	.802451
6	.887971	.862297	.837484	.813501	.790315	.767896
7	.870560	.841265	.813092	.785991	.759918	.734828
8	.853490	.820746	.789409	.759412	.730690	.703185
9	.836755	.800728	.766417	.733731	.702587	.672904
10	.820348	.781198	.744094	.708919	.675564	.643928
11	.804263	.762145	.722421	.684946	.649581	.616199
12	.788493	.743556	.701380	.661783	.624597	.589664
13	.773032	.725420	.680951	.639404	.600574	.564272
14	.757875	.707727	.661118	.617782	.577475	.539973
15	.743015	.690466	.641862	.596891	.555265	.516720
16	.728446	.673625	.623167	.576706	.533908	.494469
17	.714162	.657195	.605016	.557204	.513373	.473176
18	.700159	.647166	.587395	.538361	.493628	.452800
19	.686431	.625528	.570286	.520156	.474642	.433302
20	.672971	.610271	.553676	.502566	.456387	.414643
21	.659776	.595386	.537549	.485571	.438834	.396787
22	.646839	.580865	.521893	.469151	.421955	.379701
23	.634156	.566697	.506692	.453286	.405726	.363350
24	.621721	.552875	.491934	.437957	.390121	.347703
25	.609531	.539391	.477606	.423147	.375117	.332731
26	.597579	.526235	.463695	.408838	.360689	.318402
27	.585862	.513399	.450189	.395012	.346817	.304691
28	.574374	.500878	.437077	.381654	.333477	.291571
29	.563112	.488661	.424346	.368748	.320651	.279015
30	.552071	.476743	.411987	.356278	.308319	.267000
31	.541246	.465115	.399987	.344230	.296460	.255502
32	.530633	.453770	.388337	.332590	.285058	.244500
33	.520229	.442703	.377026	.321343	.274094	.233971
34	.510028	.431905	.366045	.310476	.263552	.223896
35	.500028	.421371	.355383	.299977	.253415	.214254
36	.490223	.411093	.345032	.289833	.243669	.205028
37	.480611	.401067	.334983	.280032	.234297	.196199
38	.471187	.391285	.325226	.270562	.225285	.187750
39	.461948	.381741	.315754	.261413	.216621	.179665
40	.452890	.372430	.306557	.252572	.208289	.171929
41	.444010	.363347	.297628	.244031	.200278	.164525

discounting at the Rates of 2, 2½, 3, 3½, 4, 4½, 5, 6, 7, 8, 9, and 10 *per cent.* Compound Interest.

Years.	5 per cent	6 per cent.	7 per cent	8 per cent.	9 per cent	10 per cent.
1	.952381	.943396	.934579	.925926	.917431	.909090
2	.907029	.889996	.873438	.857338	.841680	.826446
3	.863838	.839619	.816297	.793832	.772183	.751314
4	.822702	.792094	.762895	.735029	.708425	.683013
5	.783526	.747258	.712986	.680583	.649931	.620921
6	.746215	.704961	.666342	.630169	.596267	.564473
7	.710681	.665057	.622749	.583490	.547034	.513158
8	.676839	.627412	.582009	.540268	.501866	.466507
9	.644609	.591898	.543933	.500249	.460427	.424097
10	.613913	.558395	.508349	.463193	.422410	.385543
11	.584679	.526788	.475092	.428882	.387532	.350493
12	.556837	.496969	.444012	.397113	.355534	.318630
13	.530321	.468839	.414964	.367698	.326178	.289664
14	.505068	.442301	.387817	.340461	.299246	.263331
15	.481017	.417265	.362446	.315241	.274538	.239392
16	.458112	.393646	.338734	.291890	.251869	.217629
17	.436297	.371364	.316574	.270269	.231073	.197844
18	.415521	.350344	.295864	.250249	.211993	.179858
19	.395734	.330513	.276508	.231712	.194489	.163508
20	.376889	.311805	.258419	.214548	.178430	.148643
21	.358942	.294155	.241513	.198655	.163698	.135130
22	.341850	.277505	.225713	.183940	.150181	.122845
23	.325571	.261797	.210947	.170315	.137781	.111678
24	.310068	.246979	.197146	.157699	.126404	.101525
25	.295303	.232999	.184249	.146018	.115967	.092296
26	.281241	.219810	.172195	.135201	.106392	.083905
27	.267848	.207368	.160930	.125186	.097607	.076277
28	.255094	.195630	.150402	.115913	.089548	.069343
29	.242946	.184557	.140562	.107327	.082154	.063039
30	.231377	.174110	.131367	.099377	.075371	.057308
31	.220359	.164255	.122773	.092016	.069147	.052098
32	.209866	.154957	.114741	.085200	.063438	.047362
33	.199873	.146186	.107234	.078889	.058200	.043056
34	.190355	.137912	.100219	.073045	.053394	.039142
35	.181290	.130105	.093663	.067634	.048986	.035584
36	.172657	.122741	.087535	.062624	.044941	.032349
37	.164436	.115793	.081808	.057985	.041230	.029408
38	.156605	.109239	.076456	.053690	.037826	.026734
39	.149148	.103056	.071455	.049713	.034703	.024304
40	.142046	.097222	.066780	.046031	.031837	.022094
41	.135282	.091719	.062412	.042621	.029208	.020086

TABLE I. continued.

Years.	2 per cent	2½ per cent	3 per cent	3½ per cent	4 per cent	4½ per cent.
42	.435304	.354483	.288959	.235779	.192575	.157440
43	.426769	.345839	.280543	.227806	.185168	.150661
44	.418401	.337404	.272372	.220102	.178046	.144173
45	.410197	.329174	.264439	.212659	.171198	.137964
46	.402153	.321146	.256737	.205468	.164614	.132023
47	.394268	.313313	.249259	.198520	.158283	.126338
48	.386537	.305671	.241999	.191806	.152195	.120898
49	.378958	.298216	.234950	.185320	.146341	.115692
50	.371528	.290942	.228107	.179053	.140713	.110710
51	.364243	.283846	.221463	.172998	.135301	.105942
52	.357101	.276923	.215013	.167148	.130097	.101380
53	.350099	.270168	.208750	.161496	.125093	.097014
54	.343234	.263579	.202670	.156035	.120282	.092837
55	.336504	.257150	.196767	.150758	.115656	.088839
56	.329906	.250878	.191036	.145660	.111207	.085013
57	.323437	.244759	.185472	.140734	.106930	.081353
58	.317095	.238790	.180070	.135975	.102817	.077849
59	.310878	.232966	.174825	.131377	.098863	.074497
60	.304782	.227283	.169733	.126934	.095060	.071289
61	.298806	.221740	.164789	.122642	.091404	.068219
62	.292947	.216332	.159990	.118495	.087889	.065281
63	.287203	.211055	.155330	.114487	.084508	.062470
64	.281572	.205907	.150806	.110616	.081258	.059780
65	.276051	.200885	.146413	.106875	.078133	.057206
66	.270638	.195986	.142149	.103261	.075128	.054743
67	.265331	.191205	.138009	.099769	.072238	.052385
68	.260128	.186542	.133989	.096395	.069460	.050129
69	.255028	.181992	.130086	.093136	.066788	.047971
70	.250027	.177553	.126297	.089986	.064219	.045905
71	.245125	.173223	.122619	.086943	.061749	.043928
72	.240319	.168998	.119047	.084003	.059374	.042037
73	.235607	.164876	.115580	.081162	.057091	.040226
74	.230987	.160854	.112214	.078418	.054895	.038494
75	.226458	.156931	.108945	.075766	.052784	.036836
76	.222017	.153104	.105772	.073204	.050754	.035250
77	.217664	.149369	.102691	.070728	.048801	.033732
78	.213396	.145726	.099700	.068336	.046924	.032280
79	.209212	.142172	.096796	.066020	.045120	.030890
80	.205109	.138704	.093977	.063793	.043384	.029559
81	.201088	.135321	.091240	.061636	.041716	.028287
82	.197145	.132021	.088582	.059551	.040111	.027069
83	.193279	.128801	.086002	.057538	.038569	.025903
84	.189490	.125659	.083497	.055592	.037085	.024787
85	.185774	.122594	.081065	.053712	.035659	.023720

TABLE I. continued.

Years.	5 per cent	6 per cent.	7 per cent	8 per cent.	9 per cent	10 per cent.
42	.128840	.086527	.058328	.039464	.026797	.018260
43	.122704	.081630	.054512	.036540	.024584	.016600
44	.116861	.077009	.050946	.033834	.022554	.015091
45	.111297	.072650	.047613	.031327	.020692	.013719
46	.105997	.068538	.044498	.029007	.018983	.012472
47	.100949	.064658	.041587	.026858	.017416	.011338
48	.096142	.060998	.038866	.024869	.015978	.010307
49	.091564	.057546	.036324	.023027	.014658	.009370
50	.087204	.054288	.033947	.021321	.013448	.008518
51	.083051	.051215	.031726	.019741	.012338	.007744
52	.079096	.048316	.029651	.018279	.011319	.007040
53	.075330	.045582	.027711	.016925	.010384	.006400
54	.071743	.043001	.025898	.015671	.009527	.005818
55	.068326	.040567	.024204	.014510	.008740	.005289
56	.065073	.038271	.022620	.013436	.008018	.004808
57	.061974	.036105	.021141	.012440	.007356	.004371
58	.059023	.034061	.019758	.011519	.006749	.003974
59	.056212	.032133	.018465	.010665	.006192	.003612
60	.053536	.030314	.017257	.009875	.005680	.003284
61	.050986	.028598	.016128	.009144	.005211	.002985
62	.048558	.026980	.015073	.008467	.004781	.002714
63	.046246	.025453	.014087	.007839	.004386	.002467
64	.044044	.024012	.013165	.007259	.004024	.002243
65	.041946	.022653	.012304	.006721	.003692	.002039
66	.039949	.021370	.010499	.006223	.003387	.001853
67	.038047	.020161	.010747	.005762	.003107	.001685
68	.036235	.019020	.010044	.005335	.002851	.001532
69	.034509	.017943	.009386	.004940	.002615	.001392
70	.032866	.016927	.008772	.004574	.002399	.001266
71	.031301	.015969	.008198	.004235	.002201	.001151
72	.029811	.015065	.007662	.003921	.002019	.001046
73	.028391	.014213	.007161	.003631	.001853	.000951
74	.027039	.013408	.006692	.003362	.001700	.000864
75	.025752	.012649	.006254	.003113	.001559	.000786
76	.024525	.011933	.005845	.002882	.001430	.000714
77	.023357	.011258	.005463	.002669	.001312	.000649
78	.022245	.010620	.005105	.002471	.001204	.000590
79	.021186	.010019	.004771	.002288	.001104	.000537
80	.020177	.009452	.004459	.002118	.001013	.000488
81	.019216	.008917	.004167	.001961	.000930	.000443
82	.018301	.008412	.003895	.001816	.000853	.000403
83	.017430	.007930	.003640	.001682	.000782	.000366
84	.016600	.007487	.003402	.001557	.000718	.000333
85	.015809	.007063	.003179	.001442	.000658	.000303

TABLE I. continued.

Years.	2 per cent	2½ per cent	3 per cent	3½ per cent	4 per cent	4½ per cent
86	.182132	.119604	.078704	.051896	.034287	.022699
87	.178560	.116687	.076412	.050141	.032969	.021721
88	.175059	.113841	.074186	.048445	.031701	.020786
89	.171627	.111065	.072026	.046807	.030481	.019891
90	.168261	.108356	.069928	.045224	.029309	.019034
91	.164962	.105713	.067891	.043695	.028182	.018215
92	.161727	.103134	.065914	.042217	.027098	.017430
93	.158556	.100619	.063994	.040789	.026056	.016680
94	.155447	.098165	.062130	.039410	.025053	.015961
95	.152399	.095770	.060320	.038077	.024090	.015274
96	.149411	.093435	.058563	.036790	.023163	.014616
97	.146482	.091156	.056858	.035546	.022272	.013987
98	.143609	.088932	.055202	.034344	.021416	.013385
99	.140793	.086763	.053594	.033182	.020592	.012808
100	.138033	.094647	.052033	.032060	.019800	.012257

TABLE I. continued.

Years.	5 per cent	6 per cent.	7 per cent	8 per cent.	9 per cent	10 per cent.
86	.015056	.006665	.002971	.001335	.000604	.000275
87	.014339	.006286	.002777	.001236	.000554	.000250
88	.013657	.005930	.002595	.001144	.000508	.000227
89	.013006	.005595	.002425	.001060	.000466	.000207
90	.012387	.005278	.002267	.000981	.000423	.000188
91	.011797	.004979	.002118	.000908	.000392	.000171
92	.011235	.004697	.001980	.000841	.000360	.000155
93	.010700	.004432	.001850	.000779	.000330	.000141
94	.010191	.004181	.001729	.000721	.000303	.000128
95	.009705	.003944	.001616	.000668	.000278	.000116
96	.009243	.003721	.001510	.000618	.000255	.000106
97	.008803	.003510	.001411	.000572	.000234	.000096
98	.008384	.003312	.001319	.000530	.000214	.000087
99	.007985	.003124	.001233	.000491	.000197	.000079
100	.007604	.002947	.001152	.000454	.000180	.000072

TABLE II.

The present Value of an Annuity of One Pound for any Number of Years not exceeding 100.

Years.	2 per cent.	2½ per cent.	3 per cent.	3½ per cent.	4 per cent.	5 per cent.
1	.9803	.9756	.9708	.9662	.9615	.9523
2	1.9415	1.9274	1.9134	1.8997	1.8861	1.8594
3	2.8838	2.8560	2.8286	2.8016	2.7751	2.7232
4	3.8077	3.7619	3.7170	3.6731	3.6299	3.5459
5	4.7134	4.6458	4.5797	4.5151	4.4518	4.3294
6	5.6014	5.5081	5.4171	5.3286	5.2421	5.0756
7	6.4719	6.3493	6.2302	6.1145	6.0020	5.7863
8	7.3254	7.1701	7.0196	6.8740	6.7327	6.4632
9	8.1622	7.9708	7.7861	7.6077	7.4353	7.1078
10	8.9825	8.7520	8.5302	8.3166	8.1109	7.7217
11	9.7868	9.5142	9.2526	9.0015	8.7605	8.3064
12	10.575	10.257	9.9540	9.6633	9.3850	8.8632
13	11.348	10.983	10.6349	10.3027	9.9856	9.3935
14	12.106	11.690	11.2960	10.9205	10.5631	9.8986
15	12.849	12.381	11.9379	11.5174	11.1184	10.3796
16	13.577	13.055	12.5611	12.0941	11.6523	10.8377
17	14.291	13.712	13.1661	12.6513	12.1656	11.2740
18	14.992	14.353	13.7535	13.1897	12.6593	11.6895
19	15.678	14.978	14.3238	13.7098	13.1339	12.0853
20	16.351	15.589	14.8774	14.2124	13.5903	12.4622
21	17.011	16.184	15.4150	14.6980	14.0291	12.8211
22	17.658	16.765	15.9369	15.1671	14.4511	13.1630
23	18.292	17.332	16.4436	15.6204	14.8568	13.4885
24	18.913	17.884	16.9355	16.0584	15.2469	13.7986
25	19.523	18.424	17.4131	16.4815	15.6220	14.0939
26	20.121	18.950	17.8768	16.8904	15.9827	14.3751
27	20.706	19.464	18.3270	17.2854	16.3295	14.6430
28	21.281	19.964	18.7641	17.6670	16.6630	14.8981
29	21.844	20.453	19.1884	18.0358	16.9837	15.1410
30	22.396	20.930	19.6004	18.3920	17.2920	15.3724
31	22.937	21.395	20.0004	18.7363	17.5884	15.5928
32	23.468	21.849	20.3887	19.0689	17.8735	15.8026
33	23.988	22.291	20.7657	19.3902	18.1476	16.0025
34	24.498	22.723	21.1318	19.7007	18.4111	16.1929
35	24.998	23.145	21.4872	20.0007	18.6646	16.3741
36	25.488	23.556	21.8322	20.2905	18.9082	16.5468
37	25.969	23.957	22.1672	20.5705	19.1425	16.7112
38	26.440	24.348	22.4924	20.8411	19.3678	16.8678
39	26.902	24.730	22.8082	21.1025	19.5844	17.0170
40	27.355	25.102	23.1147	21.3551	19.7927	17.1590
41	27.799	25.466	23.4124	21.5991	19.9930	17.2943

at the several Rates of 2, 2½, 3, 3½, 4, 5, 6, 7, 8, 9, and 10 *per cent.*

Years.	6 per cent.	7 per cent.	8 per cent.	9 per cent.	10 per cent.
1	.9433	.9345	.9259	.9174	.9090
2	1.8333	1.8080	1.7832	1.7591	1.7355
3	2.6730	2.6243	2.5770	2.5312	2.4868
4	3.4651	3.3872	3.3121	3.2397	3.1698
5	4.2123	4.1001	3.9927	3.8896	3.7907
6	4.9173	4.7665	4.6228	4.4859	4.3552
7	5.5823	5.3892	5.2063	5.0329	4.8684
8	6.2097	5.9712	5.7466	5.5348	5.3349
9	6.8016	6.5152	6.2468	5.9952	5.7590
10	7.3600	7.0235	6.7100	6.4176	6.1445
11	7.8868	7.4986	7.1389	6.8051	6.4950
12	8.3838	7.9426	7.5360	7.1607	6.8136
13	8.8526	8.3576	7.9037	7.4869	7.1033
14	9.2949	8.7454	8.2442	7.7861	7.3666
15	9.7122	9.1079	8.5594	8.0606	7.6060
16	10.1058	9.4466	8.8518	8.3125	7.8237
17	10.4772	9.7632	9.1216	8.5436	8.0215
18	10.8276	10.059	9.3718	8.7556	8.2014
19	11.1581	10.335	9.6036	8.9501	8.3649
20	11.4699	10.594	9.8181	9.1285	8.5135
21	11.7640	10.835	10.016	9.2922	8.6486
22	12.0415	11.061	10.200	9.4424	8.7715
23	12.3033	11.272	10.371	9.5802	8.8832
24	12.5503	11.469	10.528	9.7066	8.9847
25	12.7833	11.653	10.674	9.8225	9.0770
26	13.0031	11.825	10.809	9.9289	9.1609
27	13.2105	11.986	10.935	10.026	9.2372
28	13.4061	12.137	11.051	10.116	9.3065
29	13.5907	12.277	11.158	10.198	9.3696
30	13.7648	12.409	11.257	10.273	9.4269
31	13.9290	12.531	11.349	10.342	9.4790
32	14.0840	12.646	11.434	10.406	9.5263
33	14.2302	12.753	11.513	10.464	9.5694
34	14.3681	12.854	11.586	10.517	9.6085
35	14.4982	12.947	11.654	10.566	9.6441
36	14.6209	13.035	11.717	10.611	9.6765
37	14.7367	13.117	11.778	10.652	9.7059
38	14.8460	13.193	11.828	10.690	9.7326
39	14.9490	13.264	11.878	10.725	9.7569
40	15.0462	13.331	11.924	10.757	9.7790
41	15.1380	13.394	11.967	10.786	9.7991

TABLE II. continued.

Years.	2 per cent.	2½ per cent	3 per cent	3½ per cent	4 per cent	5 per cent
42	28.234	25.820	23.7015	21.8349	20.1856	17.4232
43	28.661	26.166	23.9819	22.0627	20.3707	17.5459
44	29.079	26.503	24.2542	22.2828	20.5488	17.6627
45	29.490	26.833	24.5187	22.4955	20.7200	17.7740
46	29.892	27.154	24.7754	22.7009	20.8846	17.8800
47	30.286	27.467	25.0247	22.8994	21.0429	17.9810
48	30.673	27.773	25.2667	23.0912	21.1951	18.0771
49	31.052	28.071	25.5016	23.2766	21.3414	18.1687
50	31.423	28.362	25.7297	23.4556	21.4821	18.2559
51	31.787	28.646	25.9512	23.6286	21.6174	18.3389
52	32.144	28.923	26.1662	23.7958	21.7475	18.4180
53	32.495	29.193	26.3749	23.9573	21.8726	18.4934
54	32.838	29.456	26.5776	24.1133	21.9929	18.5651
55	33.174	29.713	26.7744	24.2641	22.1086	18.6334
56	33.504	29.964	26.9654	24.4097	22.2198	18.6985
57	33.828	30.209	27.1509	24.5504	22.3267	18.7606
58	34.145	30.448	27.3310	24.6864	22.4295	18.8196
59	34.456	30.681	27.5058	24.8178	22.5284	18.8757
60	34.760	30.908	27.6755	24.9447	22.6234	18.9292
61	35.059	31.130	27.8403	25.0674	22.7148	18.9802
62	35.352	31.346	28.0003	25.1859	22.8027	19.0288
63	35.639	31.557	28.1556	25.3004	22.8872	19.0750
64	35.921	31.763	28.3064	25.4110	22.9685	19.1191
65	36.197	31.964	28.4528	25.5178	23.0466	19.1610
66	36.468	32.150	28.5950	25.6211	23.1218	19.2010
67	36.733	32.351	28.7330	25.7209	23.1940	19.2390
68	36.993	32.538	28.8670	25.8173	23.2635	19.2753
69	37.248	32.720	28.9971	25.9104	23.3302	19.3098
70	37.498	32.897	29.1234	26.0004	23.3944	19.3426
71	37.743	33.071	29.2460	26.0873	23.4562	19.3739
72	37.984	33.240	29.3650	26.1713	23.5156	19.4037
73	38.219	33.404	29.4806	26.2525	23.5727	19.4321
74	38.450	33.565	29.5928	26.3309	23.6276	19.4592
75	38.677	33.722	29.7018	26.4067	23.6804	19.4850
76	38.899	33.875	29.8076	26.4799	23.7311	19.5095
77	39.116	34.025	29.9103	26.5506	23.7799	19.5328
78	39.330	34.170	30.0099	26.6190	23.8268	19.5550
79	39.539	34.313	30.1067	26.6850	23.8720	19.5762
80	39.744	34.451	30.2007	26.7488	23.9153	19.5964
81	39.945	34.587	30.2920	26.8104	23.9571	19.6156
82	40.142	34.719	30.3805	26.8700	23.9972	19.6339
83	40.336	34.847	30.4665	26.9275	24.0357	19.6513
84	40.525	34.973	30.5500	26.9831	24.0728	19.6680
85	40.711	35.096	30.6311	27.0368	24.1085	19.6838

TABLE II. continued.

Years.	6 per cent.	7 per cent.	8 per cent.	9 per cent.	10 per cent.
42	15.2245	13.452	12.006	10.813	9.8173
43	15.3061	13.507	12.043	10.837	9.8339
44	15.3831	13.557	12.077	10.860	0.8490
45	15.4558	13.605	12.108	10.881	9.8628
46	15.5243	13.650	12.137	10.900	9.8752
47	15.5890	13.691	12.164	10.917	9.8866
48	15.6500	13.730	12.189	10.933	9.8969
49	15.7075	13.766	12.212	10.948	9.9062
50	15.7618	13.800	12.233	10.961	9.9148
51	15.8130	13.832	12.253	10.974	9.9225
52	15.8613	13.862	12.271	10.985	9.9295
53	15.9069	13.889	12.288	10.995	9.9359
54	15.9499	13.915	12.304	11.005	9.9418
55	15.9905	13.939	12.318	11.013	9.9471
56	16.0288	13.962	12.332	11.022	9.9519
57	16.0649	13.983	12.344	11.029	9.9562
58	16.0989	14.003	12.356	11.036	9.9602
59	16.1311	14.021	12.366	11.042	9.9638
60	16.1614	14.039	12.376	11.047	9.9671
61	16.1900	14.055	12.385	11.053	9.9701
62	16.2170	14.070	12.394	11.057	9.9728
63	16.2424	14.084	12.402	11.062	9.9753
64	16.2664	14.097	12.409	11.066	9.9775
65	16.2891	14.104	12.415	11.070	9.9796
66	16.3104	14.121	12.422	11.073	9.9814
67	16.3306	14.132	12.427	11.076	9.9831
68	16.3496	14.142	12.433	11.079	9.9846
69	16.3676	14.151	12.436	11.082	9.9860
70	16.3845	14.160	12.442	11.084	9.9873
71	16.4005	14.168	12.447	11.086	9.9884
72	16.4155	14.176	12.450	11.088	9.9895
73	16.4297	14.183	12.454	11.090	9.9904
74	16.4431	14.190	12.457	11.092	9.9913
75	16.4558	14.196	12.461	11.093	9.9921
76	16.4677	14.202	12.463	11.095	9.9928
77	16.4790	14.207	12.466	11.096	9.9935
78	16.4896	14.212	12.468	11.097	9.9940
79	16.4996	14.217	12.471	11.098	9.9946
80	16.5091	14.222	12.473	11.099	9.9951
81	16.5180	14.226	12.475	11.100	9.9955
82	16.5264	14.230	12.477	11.101	9.9959
83	16.5343	14.233	12.478	11.102	9.9963
84	16.5418	14.237	12.480	11.103	9.9966
85	16.5489	14.240	12.481	11.104	9.9969

TABLE II. continued.

Years.	2 per cent.	2½ percent.	3 per cent.	3½ percent	4 percent.	5 per cent
86	40.893	35.215	30.7098	27.0887	24.1428	19.6988
87	41.071	35.332	30.7862	27.1388	24.1757	19.7132
88	41.247	35.446	30.8604	27.1873	24.2074	19.7268
89	41.418	35.557	30.9324	27.2341	24.2379	19.7398
90	41.586	35.665	31.0024	27.2793	24.2672	19.7522
91	41.751	35.771	31.0703	27.3230	24.2954	19.7640
92	41.913	35.874	31.1362	27.3652	24.3225	19.7752
93	42.072	35.975	31.2002	27.4060	24.3486	19.7859
94	42.227	36.073	31.2623	27.4454	24.3736	19.7961
95	42.380	36.169	31.3226	27.4835	24.3977	19.8058
96	42.529	36.262	31.3812	27.5203	24.4209	19.8151
97	42.675	36.353	31.4380	27.5558	24.4431	19.8239
98	42.819	36.442	31.4932	27.5902	24.4646	19.8323
99	42.960	36.529	31.5468	27.6234	24.4852	19.8403
100	43.098	36.614	31.5989	27.6554	24.5050	19.8479
Perp.	50.000	40.000	33.3333	28.5714	25.0000	20.0000

TABLE

TABLE II. continued.

Years.	6 per cent.	7 per cent.	8 per cent.	9 per cent.	10 per cent.
86	16.5556	14.243	12.483	11.104	9.9972
87	16.5618	14.246	12.484	11.104	9.9974
88	16.5678	14.248	12.485	11.105	9.9977
89	16.5734	14.251	12.486	11.105	9.9979
90	16.5787	14.253	12.487	11.106	9.9981
91	16.5836	14.255	12.488	11.106	9.9982
92	16.5883	14.257	12.489	11.107	9.9984
93	16.5928	14.259	12.490	11.107	9.9985
94	16.5969	14.261	12.491	11.107	9.9987
95	16.6009	14.262	12.491	11.108	9.9988
96	16.6046	14.264	12.492	11.108	9.9989
97	16.6081	14.265	12.492	11.108	9.9990
98	16.6114	14.266	12.493	11.108	9.9991
99	16.6145	14.268	12.493	11.108	9.9992
100	16.6175	14.269	12.494	11.109	9.9992
Perp.	16.6667	14.286	12.501	11.111	10.000

TABLE III.

Shewing the Sum to which £1 Principal will in-

Yrs.	2 per cent	2½ per cent	3 per cent.	3½ per cent.	4 per cent.	5 per cent.
1	1.02000	1.02500	1.030,000	1.085,000	1.040,000	1.050,000
2	1.04040	1.05062	1.060,900	1.071,225	1.081,600	1.102,500
3	1.06120	1.07689	1.092,727	1.108,717	1.124,864	1.157,625
4	1.08243	1.10381	1.125,508	1.147,523	1.169,858	1.215,506
5	1.10408	1.13140	1.159,274	1.187,686	1.216,652	1.276,281
6	1.12616	1.15969	1.194,052	1.229,255	1.265,319	1.340,095
7	1.14868	1.18868	1.229,873	1.272,279	1.315,931	1.407,100
8	1.17165	1.21840	1.266,770	1.316,809	1.368,569	1.477,455
9	1.19509	1.24886	1.304,773	1.362,897	1.423,311	1.551,328
10	1.21899	1.28008	1.343,916	1.410,598	1.480,244	1.628,894
11	1.24337	1.31208	1.384,233	1.459,969	1.539,454	1.710,339
12	1.26824	1.34488	1.425,760	1.511,068	1.601,032	1.795,856
13	1.29360	1.37851	1.468,533	1.563,956	1.665,073	1.885,649
14	1.31947	1.41297	1.512,589	1.618,694	1.731,676	1.979,931
15	1.34586	1.44829	1.557,967	1.675,348	1.800,943	2.078,928
16	1.37278	1.48450	1.604,706	1.733,986	1.872,981	2.182,874
17	1.40024	1.52161	1.652,847	1.794,675	1.947,900	2.292,018
18	1.42824	1.55965	1.702,433	1.857,489	2.025,816	2.406,619
19	1.45681	1.59865	1.753,506	1.922,501	2.106,849	2.526,950
20	1.48594	1.63861	1.806,111	1.989,788	2.191,123	2.653,297
21	1.51566	1.67958	1.860,294	2.059,431	2.278,768	2.785,962
22	1.54597	1.72157	1.916,103	2.131,511	2.369,918	2.925,260
23	1.57689	1.76461	1.973,586	2.206,114	2.464,715	3.071,523
24	1.60843	1.80872	2.032,794	2.283,328	2.563,304	3.225,099
25	1.64060	1.85394	2.093,777	2.363,244	2.665,836	3.386,354
26	1.67341	1.90029	2.156,591	2.445,958	2.772,469	3.555,672
27	1.70688	1.94780	2.221,289	2.531,567	2.883,368	3.733,456
28	1.74102	1.99649	2.287,927	2.620,171	2.998,703	3.920,129
29	1.77584	2.04640	2.356,565	2.711,877	3.118,651	4.116,135
30	1.81136	2.09756	2.427,262	2.806,793	3.243,397	4.321,942
31	1.84758	2.15000	2.500,080	2.905,031	3.373,133	4.538,039
32	1.88454	2.20375	2.575,082	3.006,707	3.508,058	4.764,941
33	1.92223	2.25885	2.652,335	3.111,942	3.648,381	5.003,188
34	1.96067	2.31532	2.731,905	3.220,860	3.794,316	5.253,347
35	1.99988	2.37320	2.813,862	3.333,590	3.946,088	5.516,015
36	2.03988	2.43253	2.898,278	3.450,266	4.103,932	5.791,816
37	2.08068	2.49334	2.985,226	3.571,025	4.268,089	6.081,406
38	2.12229	2.55568	3.074,783	3.696,011	4.438,813	6.385,477
39	2.16474	2.61957	3.167,026	3.825,371	4.616,365	6.704,751
40	2.20803	2.68506	3.262,037	3.959,259	4.801,020	7.039,988
41	2.25220	2.75219	3.359,898	4.097,833	4.993,061	7.391,988

crease at Compound Interest in any Number of Years not exceeding a hundred.

Years.	6 per cent.	7 per cent.	8 per cent.	9 per cent.	10 per cent.
1	1.060,000	1.07000	1.08000	1.09000	1.10000
2	1.123,600	1.14490	1.16640	1.18810	1.21000
3	1.191,016	1.22504	1.25971	1.29502	1.33100
4	1.262,476	1.31079	1.36048	1.41158	1.46410
5	1.338,225	1.40255	1.46932	1.53862	1.61051
6	1.418,519	1.50073	1.58687	1.67710	1.77156
7	1.503,630	1.60578	1.71382	1.82803	1.94871
8	1.593,848	1.71818	1.85093	1.99256	2.14358
9	1.689,478	1.83845	1.99900	2.17189	2.35794
10	1.790,847	1.96715	2.15892	2.36736	2.59374
11	1.898,298	2.10485	2.33163	2.58042	2.85311
12	2.012,196	2.25219	2.51817	2.81266	3.13842
13	2.132,928	2.40984	2.71962	3.06580	3.45227
14	2.260,903	2.57853	2.93719	3.34172	3.79749
15	2.396,558	2.75903	3.17216	3.64248	4.17724
16	2.540,351	2.95216	3.42594	3.97030	4.59497
17	2.692,772	3.15881	3.70001	4.32763	5.05447
18	2.854,339	3.37993	3.99601	4.71712	5.55991
19	3.025,599	3.61652	4.31570	5.14166	6.11590
20	3.207,135	3.86968	4.66095	5.60441	6.72749
21	3.399,563	4.14056	5.03383	6.10880	7.40024
22	3.603,537	4.43040	5.43654	6.65860	8.14027
23	3.819,749	4.74052	5.87146	7.25787	8.95430
24	4.048,934	5.07236	6.34118	7.91108	9.84973
25	4.291,870	5.42743	6.84847	8.62308	10.8347
26	4.549,382	5.80735	7.39635	9.39915	11.1981
27	4.822,345	6.21386	7.98806	10.2450	13.1099
28	5.111,686	6.64883	8.62710	11.1671	14.4209
29	5.418,387	7.11425	9.31727	12.1721	15.8630
30	5.743,491	7.61225	10.0626	13.2676	17.4494
31	6.088,100	8.14511	10.8676	14.4617	19.1943
32	6.453,386	8.71527	11.7370	15.7633	21.1137
33	6.840,589	9.32533	12.6760	17.1820	23.2251
34	7.251,025	9.97811	13.6901	18.7284	25.5476
35	7.686,086	10.6765	14.7853	20.4139	28.1024
36	8,147,252	11.4239	15.9681	22.2512	30.9126
37	8.636,087	12.2236	17.2456	24.2538	34.0039
38	9.154,252	13.0792	18.6252	26.4366	37.4043
39	9.703,507	13.9948	20.1152	28.8159	41.1447
40	10.285,717	14.9744	21.7245	31.4094	45.2592
41	10.902,861	16.0226	23.4624	34.2362	49.7851

TABLE III. continued.

Yrs.	2 per cent	2½ per cent	3 per cent.	3½ per cent.	4 per cent.	5 per cent.
42	2.29724	2.82099	3.460,695	4.241,258	5.192,783	7.761,587
43	2.34318	2.89152	3.564,516	4.389,702	5.400,495	8.149,666
44	2.39005	2.96380	3.671,452	4.543,341	5.616,515	8.557,150
45	2.43785	3.03790	3.781,595	4.702,358	5.841,176	8.985,007
46	2.48661	3.11385	3.895,043	4.866,941	6.074,822	9.434,258
47	2.53634	3.19169	4.011,895	5.037,284	6.317,815	9.905,971
48	2.58707	3.27148	4.132,251	5.213,588	6.570,528	10.401,269
49	2.63881	3.35327	4.256,219	5.396,065	6.833,349	10.921.333
50	2.69158	3.43710	4.383,906	5.584,926	7.106,683	11.467,399
51	2.74541	3.52303	4.515,423	5.780,399	7.390,950	12.040,769
52	2.80032	3.61111	4.650,885	5.982,713	7.686,588	12.642,808
53	2.85633	3.70139	4.790,412	6.192,108	7.994,052	13.274,948
54	2.91346	3.79392	4.934,124	6.408,832	8.313,814	13.938,696
55	2.97173	3.88877	5.082,148	6.633,141	8.646,366	14.635,630
56	3.03116	3.98599	5.234,613	6.865,301	8.992,221	15.367,412
57	3.09178	4.08564	5.391,651	7.105,586	9.351,910	16.135,783
58	3.15362	4.18778	5.553,400	7.354,282	9.725,986	16.942,572
59	3.21669	4.29247	5.720,003	7.611,682	10.115,026	17.789,700
60	3.28103	4.39978	5.891,603	7.878,090	10.519,627	18.679,185
61	3.34665	4.50978	6.068,351	8.153,824	10.940,412	19.613,145
62	3.41358	4.62252	6.250,401	8.439,207	11.378,029	20.593,802
63	3.48185	4.73809	6.437,913	8.734,580	11.833,150	21.623,492
64	3.55149	4.85654	6.631,051	9.040,290	12.306,476	22.704,667
65	3.62252	4.97795	6.829,982	9.356,700	12.798,785	23.839,900
66	3.69497	5.10240	7.034,882	9.684,185	13.310,684	25.031,895
67	3.76887	5.22996	7.245,928	10.023,131	13.843,112	26.283,490
68	3.84425	5.36071	7.463,306	10.373,941	14.396,836	27.597,664
69	3.92113	5.49473	7.687,205	10.737,029	14.972,709	28.977,548
70	3.99955	5.63210	7.917,821	11.112,825	15.571,618	30.426,425
71	4.07954	5.77290	8.155,356	11.501,774	16.194,483	31.947,746
72	4.16114	5.91722	8.400,017	11.904,336	16.842,262	33.545,134
73	4.24436	6.06515	8.652,017	12.320,988	17.515,952	35.222,390
74	4.32925	6.21678	8.911,578	12.752,222	18.216,591	36.983,510
75	4.41583	6.37220	9.178,925	13.198,550	18.945,254	38.832,685
76	4.50415	6.53151	9.454,293	13.660,499	19.703,064	40.774,320
77	4.59423	6.69480	9.737,922	14.138,617	20.491,187	42.813,036
78	4.68612	6.86217	10.030,059	14.633,468	21.310,834	44.953,688
79	4.77984	7.03372	10.330,961	15.145,640	22.163,268	47.201,372
80	4.87543	7.20956	10.640,890	15.675,737	23.049,799	49.561,441
81	4.97294	7.38980	10.960,117	16.224,388	23.971,791	52.039,513
82	5.07240	7.57455	11.288,920	16.792,241	24.930,662	54.641,488
83	5.17385	7.76391	11.627,588	17.379,970	25.927,889	57.373,563
84	5.27733	7.95801	11.976,416	17.988,269	26.965,004	60.242,241
85	5.38287	8.15696	12.335,708	18.617,858	28.043,604	63.254,353

TABLE III. continued.

Years.	6 per cent.	7 per cent.	8 per cent.	9 per cent.	10 per cent.
42	11.557,032	17.1442	25.3394	37.3175	54.7636
43	12.250,454	18.3443	27.3666	40.6761	60.2400
44	12.985,481	19.6284	29.5559	44.3369	66.2640
45	13.764,610	21.0024	31.9204	48.3272	72.8904
46	14.590,487	22.4726	34.4740	52.6767	80.1795
47	15.465,916	24.0457	37.2320	57.4176	88.1974
48	16.393,871	25.7289	40.2105	62.5852	97.0172
49	17.377,504	27.5299	43.4274	68.2179	106.718
50	18.420,154	29.4570	46.9016	74.3575	117.390
51	19.525,363	31.5190	50.6537	81.0496	129.129
52	20.696,885	33.7253	54.7060	88.3441	142.042
53	21.938,698	36.0861	59.0825	96.2951	156.247
54	23.255,020	38.6121	63.8091	104.961	171.871
55	24.650,321	41.3150	68.9138	114.408	189.059
56	26.129,340	44.2070	74.4269	124.705	207.965
57	27.697,101	47.3015	80.3811	135.928	228.761
58	29.358,927	50.6126	86.8116	148.162	251.637
59	31.120,463	54.1555	93.7565	161.496	276.801
60	32.987,690	57.9464	101.257	176.031	304.481
61	34.966,952	62.0026	109.357	191.874	334.929
62	37.064,969	66.3428	118.106	209.142	368.422
63	39.288,867	70.9868	127.554	227.965	405.265
64	41.646,199	75.9559	137.759	248.482	445.791
65	44.144,971	81.2728	148.779	270.845	490.370
66	46.793,669	86.9619	160.682	295.222	539.407
67	49.601,290	93.0492	173.536	321.792	593.348
68	52.577,367	99.5627	187.419	350.753	652.683
69	55.732,009	106.532	202.413	382.321	717.951
70	59.075,930	113.989	218.606	416.730	789.746
71	62.620,485	121.968	236.094	454.235	868.721
72	66.377,715	130.506	254.982	495.117	955.593
73	70.360,378	139.641	275.381	539.677	1051.15
74	74.582,000	149.416	297.411	588.248	1156.26
75	79.056,920	159.876	321.204	641.190	1271.89
76	83.800,336	171.067	346.900	698.898	1399.08
77	88.828,356	183.042	374.632	761.798	1538.99
78	94.158,057	195.854	404.625	830.360	1692.89
79	99.807,541	209.564	436.995	905.093	1862.18
80	105.795,993	224.234	471.954	986.551	2048.40
81	112.143,753	239.930	509.711	1075.34	2253.24
82	118.872,378	256.725	550.488	1172.12	2478.56
83	126.004,720	274.696	594.527	1277.61	2726.42
84	133.565,004	293.925	642.089	1392.59	2999.06
85	141.578,904	314.500	693.456	1517.93	3298.96

TABLE III. continued.

Yrs.	2 per cent	2½ per cent	3 per cent.	3½ per cent.	4 per cent.	5 per cent.
86	5.49053	8.36088	12.705,779	19.269,483	29.165,349	66.417,071
87	5.60034	8.56991	13.086,953	19.943,915	30.331,963	69.737,924
88	5.71235	8.78415	13.479,561	20.641,952	31.545,241	73.224,820
89	5.82660	9.00376	13.883,948	21.364,521	32.807,051	76.886,061
90	5.94313	9.22885	14.300,467	22.112,175	34.119,333	80.730,365
91	6.06199	9.45957	14.729,481	22.886,102	35.484,106	84.766,883
92	6.18323	9.69606	15.171,365	23.687,115	36.903,470	89.005,227
93	6.30690	9.93846	15.626,506	24.516,164	38.379,609	93.455,488
94	6.43303	10.1869	16.095,301	25.374,230	39.914,794	98.128,263
95	6.56169	10.4416	16.578,160	26.262,328	41.511,385	103.034,676
96	6.69293	10.7026	17.075,505	27.181,510	43.171,841	108.186,410
97	6.82679	10.9702	17.587,770	28.132,862	44.898,715	113.595,730
98	6.96332	11.2444	18.115,403	29.117,513	46.694,663	119.275,517
99	7.10259	11.5255	18.658,866	30.136,626	48.562,450	125.239,293
100	7.24464	11.8137	19.218,632	31.191,408	50.504,948	131.501,257

TABLE III. continued.

Years.	6 per cent.	7 per cent	8 per cent.	9 per cent.	10 per cent.
86	150.078,638	336.516	748.938	1664.54	3628.86
87	159.078,057	360.071	808.847	1808.45	3991.75
88	168.622,740	385.276	873.555	1965.76	4390.92
89	178.740,104	412.245	943.439	2142.68	4830.02
90	189.464,511	441.102	1018.91	2335.52	5313.02
91	200.832,381	471.980	1100.42	2545.72	5844.32
92	212.882,324	505.018	1188.46	2774.83	6428.75
93	225.655,264	540.370	1283.58	3024.57	7071.63
94	239.194,580	578.196	1386.22	3296.78	7778.79
95	253.546,254	618.669	1497.12	3593.49	8556.67
96	268.759,030	661.976	1616.89	3916.91	9412.34
97	284.884,572	708.314	1746.24	4269.43	10353.58
98	301.977,646	757.897	1885.94	4653.68	11388.93
99	320.096,305	810.949	2036.81	5072.51	12527.82
100	339.302,083	867.716	2199.76	5529.04	13780.61

TABLE IV.

Shewing the Sum to which £1 *per ann.* will in-

Yrs.	2 per cent.	2½ per cent.	3 per cent.	3½ per cent.	4 per cent.	5 per cent.
1	1.00000	1.00000	1.000,000	1.000,000	1.000,000	1,000,000
2	2.02000	2.02500	2.030,000	2.035,000	2.040,000	2.050,000
3	3.06040	3.07562	3.090,900	3.106,225	3.121,600	3,152,500
4	4.12160	4.15251	4.183,627	4.214,942	4.246,464	4.310,125
5	5.20404	5.25633	5.309,135	5.362,265	5.416,322	5,525,631
6	6.30812	6.38773	6.468,409	6.550,152	6.632,975	6.801,912
7	7.43428	7.54743	7.662,462	7.779,407	7.898,294	8.142,008
8	8.58296	8.73611	8.892,336	9.051,686	9.214,226	9.549,108
9	9.75462	9.95451	10.159,106	10.368,495	10.582,795	11,026,564
10	10.9497	11.2033	11,463,879	11.731,393	12.006,107	12.577,892
11	12.1687	12.4834	12.807,795	13.141,991	13.486,351	14.206,787
12	13.4120	13.7955	14.192,029	14.601,961	15.025,805	15.917,126
13	14.6803	15.1404	15.617,790	16.113,030	16.626,837	17.712,982
14	15.9739	16.5189	17.086,324	17.676,986	18.291,911	19.598,631
15	17.2934	17.9319	18.598,913	19.295,680	20.023,587	21.578,563
16	18.6392	19.3802	20.156,881	20.971,029	21.824,531	23.657,491
17	20.0120	20.8647	21.761,587	22.705,015	23.697,512	25.840,366
18	21.4123	22.3863	23.414,435	24.499,691	25.645,412	28.132,384
19	22.8405	23.9460	25.116,868	26.357,180	27.671,229	30.539,003
20	24.2973	25.5446	26.870,374	28.279,681	29.778,078	33.065,954
21	25.7833	27.1832	28.676,485	30.269,470	31.969,201	35.719,251
22	27.2989	28.8628	30.536,780	32.328,902	34.247,969	38.505,214
23	28.8449	30.5844	32.452,883	34.460,413	36.617,888	41.430,475
24	30.4218	32.3490	34.426,470	36.666,525	39.082,604	44.501,998
25	32.0302	34.1577	36.459,264	38.949,856	41.645,908	47.727,098
26	33.6709	36.0117	38.553,042	41.313,101	44.311,744	51.113,453
27	35.3443	37.9120	40.709,633	43.759,060	47.084,214	54.669,126
28	37.0512	39 8598	42.930,922	46.290,627	49.967,582	58.402,582
29	38.7922	41.8562	45.218,850	48.910,799	52.966,286	62.322,711
30	40.5680	43.9027	47.575,415	51.622,677	56.084,937	66.438,847
31	42.3794	46.0002	50.002,678	54.429,470	59.328,335	70.760,789
32	44.2270	48.1502	52.502,758	57.334,502	62.701,468	75.298,829
33	46.1115	50.3540	55.077,841	60.341,210	66.209,527	80.063,770
34	48.0338	52.6128	57.730,176	63.453,152	69.857,908	85.066,959
35	49.9944	54.9282	60.462,081	66.674,012	73.652,224	90.320,307
36	51.9943	57.3014	63.275,944	70.007,603	77.598,313	95.836,322
37	54.0342	59.7339	66.174,222	73.457,869	81.702,246	101.628,138
38	56.1149	62.2272	69.159,449	77.028,894	85.970,336	107.709,545
39	58.2372	64.7829	72.234,232	80.724,906	90.409,149	114.095,023
40	60.4019	67.4025	75.401,259	84.550,277	95.025,515	120.799,774
41	62.6100	70.0876	78.663,297	88.509,537	99.826,536	127.839,762

crease at Compound Interest in any Number of Years not exceeding a hundred.

Years.	6 per cent.	7 per cent.	8 per cent.	9 per cent.	10 per cent.
1	1.000,000	1.00000	1.00000	1.00000	1.00000
2	2.060,000	2.07000	2.08000	2.09000	2.10000
3	3.183,600	3.21490	3.24640	3.27810	3.31000
4	4.374,616	4.43994	4.50611	4.57312	4.64100
5	5.637,092	5.75073	5.86660	5.98471	6.10510
6	6.975,318	7.15329	7.33592	7.52333	7.71561
7	8.393,837	8.65402	8.92280	9.20043	9.48717
8	9.897,467	10.2598	10.6366	11.0284	11.4958
9	11.491,315	11.9779	12.4875	13.0210	13.5794
10	13.180,794	13.8164	14.4865	15.1929	15.9374
11	14.791,642	15.7836	16.6454	17.5602	18.5311
12	16.869,941	17.8884	18.9771	20.1407	21.3842
13	18.882,137	20.1406	21.4952	22.9533	24.5227
14	21.015,065	22.5504	24.2149	26.0191	27.9749
15	23.275,969	25.1290	27.1521	29.3609	31.7724
16	25.672,528	27.8880	30.3242	33.0033	35.9497
17	28.212,879	30.8402	33.7502	36.9737	40.5447
18	30.905,652	33.9990	37.4502	41.3013	45.5991
19	33.759,991	37.3789	41.4462	46.0184	51.1590
20	36.785,591	40.9954	45.7619	51.1601	57.2750
21	39.992,726	44.8651	50.4229	56.7645	64.0025
22	43.392,290	49.0057	55.4567	62.8733	71.4027
23	46.995,827	53.4361	60.8932	69.5319	79.5430
24	50.815,577	58.1766	66.7647	76.7898	88.4973
25	54.864,512	63.2490	73.1059	84.7008	98.3470
26	59.156,382	68.6764	79.9544	93.3239	109.181
27	63.705,765	74.4838	87.3507	102.723	121.099
28	68.528,111	80.6976	95.3388	112.968	134.209
29	73.639,798	87.3465	103.965	124.135	148.630
30	79.058,186	94.4607	113.283	136.307	164.494
31	84.801,677	102.073	123.345	149.575	181.943
32	90.889,778	110.218	134.213	164.036	201.137
33	97.343,164	118.933	145.950	179.800	222.251
34	104.183,754	128.258	158.626	196.982	245.476
35	111.434,779	138.236	172.316	215.710	271.024
36	119.120,866	148.913	187.102	236.124	299.126
37	127.268,118	160.337	203.070	258.375	330.039
38	135.904,205	172.561	220.315	282.629	364.043
39	145.058,458	185.640	238.941	309.066	401.447
40	154.761,965	199.635	259.056	337.882	442.592
41	165.047,683	214.609	280.781	369.291	487.851

TABLE IV. continued.

Yrs.	2 per cent.	2½ per cent	3 per cent.	3½ per cent.	4 per cent.	5 per cent.
42	64.8622	72.8398	82.023,196	92.607,371	104.819,597	135.231,751
43	67.1594	75.6608	85.483,892	96.848,629	110.012,381	142.993,338
44	69.5026	78.5523	89.048,409	101.238,331	115.412,876	151.143,005
45	71.8927	81.5161	92.719,861	105.781,672	121.029,392	159.700,155
46	74.3305	84.5540	96.501,457	110.484,031	126.870,567	168.685,163
47	76.8171	87.6678	100.396,500	115.350,972	132.945,390	178.119,421
48	79.3535	90.8595	104.408,395	120.388,256	139.263,206	188.025,392
49	81.9405	94.1310	108.540,647	125.601,845	145.833,734	198.426,662
50	84.5794	97.4843	112.796,867	130.997,910	152.667,083	209.347,995
51	87.2709	100.921	117.180,773	136.582,837	159.773,767	220.815,395
52	90.0164	104.444	121.696,196	142.363,236	167.164,717	232.856,165
53	92.8167	108.055	126.347,082	148.345,949	174.851,306	245.498,973
54	95.6730	111.756	131.137,494	154.538,057	182.845,358	258.773,922
55	98.5865	115.550	136.071,619	160,946,889	191.159,173	272.712,618
56	101.558	119.439	141.158,768	167.580,030	199.805,539	287.348,249
57	104.589	123.425	146.388,381	174.445,332	208.797,761	302.715,662
58	107.681	127.511	151.780,032	181.550,918	218.149,672	318.851,444
59	110.834	131.699	157.333,433	188.905,200	227.875,659	335.794,017
60	114.051	135.991	163.053,436	196.516,882	237.990,685	353.583,717
61	117.332	140.391	168.945,039	204.394,973	248.510,312	372.262,903
62	120.679	144.901	175.013,391	212.548,797	259.450,725	391.876,048
63	124.092	149.523	181.263,792	220.988,005	270.828,754	412.469,851
64	127.574	154.261	187.701,706	229.722,585	282.661,904	434.093,343
65	131.126	159.118	194.332,757	238.762,876	294.968,380	456.798,011
66	134.748	164.096	201.162,740	248.119,577	307.767,115	480.637,911
67	138.443	169.198	208.197,622	257.803,762	321.077,800	505.669,807
68	142.212	174.429	215.443,551	267.826,894	334.920,912	531.953,297
69	146.056	179.789	222.906,858	278.200,835	349.317,748	559.550,962
70	149.977	185.284	230.594,063	288.937,864	364.290,458	588.528,510
71	153.977	190.916	238.511,885	300.050,689	379.862,077	618.954,936
72	158.057	196.689	246.667,242	311.552,463	396.056,560	650.902,683
73	162.218	202.606	255.067,259	323.456,800	412.898,822	684.447,817
74	166.462	208.671	263.719,277	335.777,788	430.414,775	719.670,208
75	170.791	214.888	272.630,855	348.530,010	448.631,366	756.653,718
76	175.207	221.260	281.809,781	361.728,561	467.576,621	795.486,404
77	179.711	227.792	291.264,074	375.389,060	487.279,686	836.260,724
78	184.305	234.486	301.001,996	389.527,677	507.770,873	879.073,760
79	188.992	241.348	311.032,056	404.161,146	529.081,708	924.027,448
80	193.771	248.382	321.363,018	419.306,786	551.244,976	971.228,821
81	198.647	255.592	332.003,909	434.982,524	574.294,775	1020.790,262
82	203.620	262.982	342.964,026	451.206,912	598.266,566	1072.829,775
83	208.692	270.556	354.252,947	467.999,154	623.197,229	1127.471,264
84	213.866	278.320	365.880,535	485.379,125	649.125,118	1184.844,827
85	219.143	286.278	377.856,951	503.367,394	676.090,123	1245.087,068

TABLE IV. continued.

Years.	6 per cent.	7 per cent.	8 per cent.	9 per cent.	10 per cent.
42	175.950,544	230.632	304.243	403.528	537.636
43	187.507,577	247.776	329.583	440.845	592.400
44	199.758,031	266.120	356.949	481.521	652.640
45	212.743,513	285.749	386.505	525.858	718.904
46	226.508,124	306.751	418.426	574.186	791.795
47	241.098,612	329.224	452.900	626.862	871.974
48	256.564,528	353.270	490.132	684.280	960.172
49	272.958,400	378.998	530.342	746.865	1057.18
50	290.335,904	406.528	573.770	815.083	1168.90
51	308.756,058	435.985	620.671	889.441	1281.29
52	323.281,422	467.504	671.325	970.490	1410.42
53	348.978,307	501.230	726.081	1058.83	1552.47
54	370.917,006	537.316	785.114	1155.13	1708.71
55	394.172,026	575.928	848.928	1260.09	1880.59
56	418.822,348	617.243	917.837	1374.50	2069.65
57	444.951,689	661.450	992.264	1499.20	2277.61
58	472.648,790	708.752	1072.64	1635.13	2506.37
59	502.007,717	759.364	1159.45	1783.29	2758.01
60	533.128,180	813.520	1253.21	1944.79	3034.81
61	566.115,871	871.466	1354.47	2120.82	3339.29
62	601.082,824	933.469	1463.82	2312.69	3674.22
63	638.147,793	999.812	1581.93	2521.84	4042.65
64	677.436,661	1070.79	1709.48	2749.80	4447.91
65	719.082,860	1146.75	1847.24	2998.28	4893.70
66	763.227,832	1228.03	1996.02	3269.13	5384.07
67	810.021,502	1314.99	2156.71	3564.35	5923.48
68	859.622,792	1408.03	2330.24	3886.14	6516.83
69	912.200,160	1507.60	2517.66	4236.90	7169.51
70	967.932,169	1614.13	2720.08	4619.22	7887.46
71	1027.008,099	1728.12	2938.68	5035.95	8677.21
72	1089.628,585	1850.09	3174.78	5490.18	9545.93
73	1156.006,300	1980.59	3429.76	5985.30	10501.53
74	1226.366,679	2120.24	3705.14	6524.98	11552.68
75	1300.948,679	2269.65	4002.55	7113.23	12708.95
76	1380.005,600	2429.53	4323.76	7754.42	13980.85
77	1463.805,936	2600.60	4670.66	8453.32	15379.93
78	1552.634,292	2783.64	5045.31	9215.12	16918.92
79	1646.792,350	2979.49	5449.94	10045.4	18611.82
80	1746.599,891	3189.06	5886.93	10950.5	20474.00
81	1852.395,884	3413.29	6358.89	11937.1	22522.40
82	1964.539,637	3653.22	6868.60	13012.4	24775.64
83	2083.412,016	3909.95	7419.08	14184.5	27254.20
84	2209.416,737	4184.65	8013.61	15462.2	29980.62
85	2342.981,741	4478.57	8655.70	16854.8	32979.69

TABLE IV. continued.

Yrs	2 per cent	2½ per cent	3 per cent.	3½ per cent.	4 per cent.	5 per cent.
86	224.526	294.435	390.192,660	521.985,252	704.133,728	1308.341,422
87	230.017	302.796	402.898,440	541.254,737	733.299,077	1374.758,493
88	235.617	311.366	415.985,393	561.198,652	763.631,040	1444.496,418
89	241.330	320.150	429.464,955	581.840,605	795.176,282	1517.721,238
90	247.156	329.154	443.348,903	603.205,027	827.983,333	1594.607,300
91	253.099	338.383	457.649,370	625.317,202	862.102,667	1675.337,665
92	259.161	347.842	472.378,851	648.203,305	897.586,773	1760.104,549
93	265.345	357.538	487.550,217	671.890,420	934.490,244	1849.109,776
94	271.651	367.477	503.176,723	696.406,585	972.869,854	1942.565,265
95	278.084	377.664	519.272,025	721.780,815	1012.784,648	2040.693,528
96	284.646	388.105	535.850,186	748.043,144	1054.296,034	2143.728,205
97	291.339	398.808	552.925,692	775.224,654	1097.467,875	2251.914,615
98	298.166	409.778	570.513,462	803.357,517	1142.366,590	2365.510,346
99	305.129	421.023	588.628,866	832.475,030	1189.061,254	2484.785,863
100	312.232	432.548	607.287,732	862.611,656	1237.623,704	2610.025,156

TABLE IV. continued.

Years.	6 per cent.	7 per cent.	8 per cent.	9 per cent	10 per cent.
86	2484.560,645	4793.07	9349.16	18372.7	36278.65
87	2634.634,284	5129.59	10098.0	20027.2	39907.52
88	2793.712,341	5489.66	10906.9	21830.7	43899.27
89	2962,335,082	5874.93	11780.4	23796.5	48290.20
90	3141.075,187	6287.18	12723.9	25939.1	53120.22
91	3330.539,698	6728,28	13742.8	28274.7	58433,25
92	3531.372,080	7200.26	14843.2	30820.4	64277.57
93	3744,254,405	7705.28	16031.7	33595.2	70706.33
94	3969,909,669	8245.65	17315.2	36619.8	77777.96
95	4209.104,249	8823.85	18701.5	39916.6	85556.76
96	4462.650,504	9442.52	20198.6	43510.1	94113.43
97	4731.409,534	10104.5	21815.5	47427.0	103525.8
98	5016.294,106	10812.8	23561.7	51696.4	113879.3
99	5318.271,753	11570.7	25447.7	56350.1	125268.3
100	5638.868,058	12381.6	27484.5	61422.6	137796.1

CONSTRUCTION *of the four preceding Tables.*

THESE Tables may be met with in most of the books which treat of compound interest and annuities; but there has been, in this work, so much occasion for referring to them, that it was necessary to save the reader the trouble of turning to other books for them.

The 1st, 2d, 3d, &c. numbers in the first table, are the quotients of unity divided by the 1st, 2d, 3d, &c. powers respectively of £1 increased by its interest for a year; that is, $\frac{1}{r}$, $\frac{1}{r^2}$, $\frac{1}{r^3}$, &c. r signifying £1 increased by its interest for a year; or 1.02, 1.025, 1.03, 1.035, 1.04, 1.05, &c, according as the interest is 2, 2½, 3, 3½, 4, 5, &c. *per cent.*

The 2d, 3d, 4th, &c. numbers in the second table, are the *sums* of the 1st and 2d; of the 1st, 2d, and 3d; of the 1st, 2d, 3d, and 4th, &c. &c. numbers respectively in the first Table.

The numbers in the 3d Table are the powers of £1 increased by its interest for a year; that is, r, r^2, r^3, &c.

The 2d, 3d, 4th, &c. numbers in the 4th Table, are the sums of the 1st and 2d; of the 1st, 2d, and 3d; of the 1st, 2d, 3d, and 4th, &c. numbers in the 3d Table, with unity added.

USES *of the preceding Tables.*

Question I. To what *sum* or *annuity* will any given *sum* or *annuity* increase in a given number of years, at a given rate of compound interest?

Ans. Multiply the number in Table 3d under the given rate and opposite to the given number of years, by the given *sum* or *annuity*, and the product will be the answer.

EXAMPLE. The product of £40 into 2.0258 (that is, £81.032) is the sum to which £40 principal will increase in 18 years, reckoning interest at 4 *per cent.*; and the same product is likewise the *annuity* to which an *annuity* of £40 will increase in the same time, reckoning the same interest.

Quest. II. To what sum will a given *annuity* amount at a given rate of compound interest for a given number of years?

Ans. Multiply the number in the *fourth* Table under the rate and opposite to the given number of years, by the given annuity, and the *product* will be the answer.

EXAMPLE. The product of £40 into 25.6454 (that is, £1025.826) is the sum to which £40 *per ann.* will amount in 18 years, reckoning interest at 4 *per cent.*

Quest. III. In what number of years will a given *sum* or *annuity* increase to another given *sum* or *annuity* in consequence of being improved at a given rate of interest?

Ans. Divide the latter *sum* or *annuity* by the former. Find the quotient (or the number nearest to it) in the *third* Table, under the given rate, and the years opposite to it will be the answer.

Example. The quotient of £1025.826 divided by 40, is 25.6454, which number, under 4 *per cent.* in the third Table, is opposite to 18 years; which, therefore, is the number of years in which £40 will increase to £1025.826 if improved at 4 *per cent.* compound interest.

Quest. IV. In what time will a given *annuity* amount to a given *sum* at a given rate of interest?

Ans. Divide the given *sum* by the given *annuity*. Find the quotient (or the number nearest to it) in the *fourth* Table under the given rate, and the number of years corresponding to it will be the answer.

Example. A person owes £1000, and resolves to appropriate £10 *per ann.* of his income towards discharging it. In what time will such an appropriation, interest being at 4 *per cent.* amount to a sum equal to the debt?——£1000 divided by £10 gives £100. The number in the *fourth* Table, under 4 *per cent.* and nearest to this quotient, is 99.8265, which corresponds to 41 years; and this, therefore, is the time in which such an appropriation would sink the debt. In like manner, it may be found that an appropriation of a million *per ann.* would, in the same time, sink a public debt of a *hundred millions,* carrying 4 *per cent.* interest; and, in 56 years a debt of *two hundred millions*; and in 82 years, a debt of *six hundred millions.*

Quest. V. In what time will a *given principal* be annihilated by taking out of it, at the end of a year, a given sum; and after that, the same sum annually, together with its growing interests?

Ans. In the same time in which an equal annuity would amount to the *given principal.*

A person, therefore, possessed of £1000 capital, bearing interest at 4 *per cent.* would, by Quest. IV. reduce it to nothing in 41 years, by taking out of it £10 at the beginning of the first year, and as much more every following year as would be necessary, together with the interest of the remaining capital, to make his annual income constantly £50.

TABLE V.

Shewing the Probabilities of the Duration of Life, as decided by Dr. *Halley* from Observations on the Bills of Mortality of BRESLAW.

Ages.	Persons living.	Decr. of Life.	Ages	Persons living.	Decr. of Life	Ages	Persons living.	Decr. of Life.
1	1000	145	31	523	8	61	232	10
2	855	57	32	515	8	62	222	10
3	798	38	33	507	8	63	212	10
4	760	28	34	499	9	64	202	10
5	732	22	35	490	9	65	192	10
6	710	18	36	481	9	66	182	10
7	692	12	37	472	9	67	172	10
8	680	10	38	463	9	68	162	10
9	670	9	39	454	9	69	152	10
10	661	8	40	445	9	70	142	11
11	653	7	41	436	9	71	131	11
12	646	6	42	427	10	72	120	11
13	640	6	43	417	10	73	109	11
14	634	6	44	407	10	74	98	10
15	628	6	45	397	10	75	88	10
16	622	6	46	387	10	76	78	10
17	616	6	47	377	10	77	68	10
18	610	6	48	367	10	78	58	9
19	604	6	49	357	11	79	49	8
20	598	6	50	346	11	80	41	7
21	592	6	51	335	11	81	34	6
22	586	7	52	324	11	82	28	5
23	579	6	53	313	11	83	23	4
24	573	6	54	302	10	84	19	4
25	567	7	55	292	10	85	15	4
26	560	7	56	282	10	86	11	3
27	553	7	57	272	10	87	8	3
28	546	7	58	262	10	88	5	2
29	539	8	59	252	10	89	3	2
30	531	8	60	242	10	90	1	1

TABLE VI.[a]

Shewing the present Values of an Annuity of £1 on a Single Life, according to Mr. *De Moivre's* hypothesis. See Vol. I. p. 2.

Age.	3 per cent	3½ per cent	4 per cent	4½ per cent	5 per cent	6 per cent.
8	19.736	18.160	16.791	15.595	14.544	12.790
9	19.868	18.269	16.882	15.672	14.607	12.839
10	19.868	18.269	16.882	15.672	14.607	12.839
11	19.736	18.160	16.791	15.595	14.544	12.790
12	19.604	18.049	16.698	15.517	14.480	12.741
13	19.469	17.937	16.604	15.437	14.412	12.691
14	19.331	17.823	16.508	15.356	14.342	12.639
15	19.192	17.707	16.410	15.273	14.271	12.586
16	19.050	17.588	16.311	15.189	14.197	12.532
17	18.905	17.467	16.209	15.102	14.123	12.476
18	18.759	17.344	16.105	15.015	14.047	12.419
19	18.610	17.220	15.999	14.923	13.970	12.361
20	18.458	17.093	15.891	14.831	13.891	12.301
21	18.305	16.963	15.781	14.737	13.810	12.239
22	18.148	16.830	15.669	14.641	13.727	12.177
23	17.990	16.696	15.554	14.543	13.642	12.112
24	17.827	16.559	15.437	14.442	13.555	12.045
25	17.664	16.419	15.318	14.340	13.466	11.978
26	17.497	16.277	15.197	14.235	13.375	11.908
27	17.327	16.133	15.073	14.128	13.282	11.837
28	17.154	15.985	14.946	14.018	13.186	11.763
29	16.979	15.835	14.816	13.905	13.088	11.688
30	16.800	15.682	14.684	13.791	12.988	11.610
31	16.620	15.526	14.549	13.673	12.855	11.530
32	16.436	15.367	14.411	13.553	12.780	11.449
33	16.248	15.204	14.270	13.430	12.673	11.365
34	16.057	15.039	14.126	13.304	12.562	11.278
35	15.864	14.871	13.979	13.175	12.449	11.189
36	15.666	14.699	13.829	13.044	12.333	11.098
37	15.465	14.524	13.676	12.909	12.214	11.003
38	15.260	14.346	13.519	12.771	12.091	10.907
39	15.053	14.163	13.359	12.630	11.966	10.807
40	14.842	13.978	13.196	12.485	11.837	10.704
41	14.626	13.789	13.028	12.337	11.705	10.599

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[a] This Table is the same with Mr. *De Moivre's* Table of the values of single lives, published in his *Treatise on Life Annuities*, and carried as far as the age of 79, to three places of decimals, by Mr. *Dodson* in his *Mathematical Repository*, Vol. II. p. 169.

TABLE VI. continued.

Age.	3 per cent	3½ per cent	4 per cent	4½ per cent	5 per cent.	6 per cent
42	14.407	13.596	12.858	12.185	11.570	10.490
43	14.185	13.399	12.683	12.029	11.431	10.378
44	13.958	13.199	12.504	11.870	11.288	10.263
45	13.728	12.993	12.322	11.707	11.142	10.144
46	13.493	12.784	12.135	11.540	10.992	10.021
47	13.254	12.571	11.944	11.368	10.837	9.895
48	13.012	12.354	11.748	11.192	10.679	9.765
49	12.764	12.131	11.548	11.012	10.515	9.630
50	12.511	11.904	11.344	10.827	10.348	9.492
51	12.255	11.673	11.135	10.638	10.176	9.349
52	11.994	11.437	10.921	10.443	9.999	9.201
53	11.729	11.195	10.702	10.243	9.817	9.049
54	11.457	10.950	10.478	10.039	9.630	8.891
55	11.183	10.698	10.248	9.829	9.437	8.729
56	10.902	10.443	10.014	9.614	9.239	8.561
57	10.616	10.181	9.773	9.393	9.036	8.387
58	10.325	9.913	9.527	9.166	8.826	8.208
59	10.029	9.640	9.275	8.933	8.611	8.023
60	9.727	9.361	9.017	8.694	8.389	7.831
61	9.419	9.076	8.753	8.449	8.161	7.633
62	9.107	8.786	8.482	8.197	7.926	7.428
63	8.787	8.488	8.205	7.938	7.684	7.216
64	8.462	8.186	7.921	7.672	7.435	6.997
65	8.132	7.874	7.631	7.399	7.179	6.770
66	7.794	7.558	7.333	7.119	6.915	6.535
67	7.450	7.234	7.027	6.831	6.643	6.292
68	7.099	6.902	6.714	6.534	6.362	6.040
69	6.743	6.565	6.394	6.230	6.073	5.779
70	6.378	6.219	6.065	5.918	5.775	5.508
71	6.008	5.865	5.728	5.596	5.468	5.228
72	5.631	5.505	5.383	5.265	5.152	4.937
73	5.246	5.136	5.029	4.926	4.826	4.636
74	4.854	4.759	4.666	4.576	4.489	4.324
75	4.453	4.373	4.293	4.217	4.143	4.000
76	4.046	3.978	3.912	3.847	3.784	3.664
77	3.632	3.575	3.520	3.467	3.415	3.315
78	3.207	3.163	3.111	3.076	3.034	2.953
79	2.776	2.741	2.707	2.673	2.641	2.578
80	2.354	2.309	2.284	2.259	2.235	2.188
81	1.886	1.867	1.850	1.832	1.816	1.783
82	1.429	1.411	1.406	1.394	1.384	1.362
83	0.961	0.955	0.950	0.943	0.937	0.925
84	0.484	0.483	0.481	0.479	0.476	0.472
85	0.000	0.000	0.000	0.000	0.000	0.000

TABLE VII.

Shewing the Value of an Annuity on the joint continuance of Two Lives, according to Mr. *De Moivre's Hypothesis*; computed by the Rule in Note (L). See Vol. I. p. 2 and 3, and Chapter 4th, p. 204, &c.

Age of the youngest.	Age of the eldest.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
10	10	15.206	13.342	11.855
	15	14.878	13.093	11.661
	20	14.503	12.808	11.430
	25	14.074	12.480	11.182
	30	13.585	12.102	10.884
	35	13.025	11.665	10.537
	40	12.381	11.156	10.128
	45	11.644	10.564	9.646
	50	10.796	9.871	9.074
	55	9.822	9.059	8.391
	60	8.704	8.105	7.572
	65	7.417	6.980	6.585
	70	5.936	5.652	5.391
15	15	14.574	12.860	11.478
	20	14.225	12.593	11.266
	25	13.822	12.281	11.022
	30	13.359	11.921	10 736
	35	12.824	11.501	10.402
	40	12.207	11.013	10.008
	45	11.496	11.440	9.541
	50	10.675	9.767	8.985
	55	9.727	8.975	8.318
	60	8.632	8.041	7.515
	65	7.377	6.934	6.544
	70	5.932	5.623	5.364
20	20	13.904	12.341	11.067
	25	13.531	12.051	10.840

TABLE VII. continued.

Age of the youngest.	Age of the eldest.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
20	30	13.098	11.711	10.565
	35	12.594	11.314	10.278
	40	12.008	10.847	9.870
	45	11.325	10.297	9.420
	50	10.536	9.648	8.880
	55	9.617	8.879	8.233
	60	8.549	7.967	7.448
	65	7.308	6.882	6.495
	70	5.868	5.590	5.333
25	25	13.192	11.786	10.621
	30	12.794	11.468	10.367
	35	12.333	11.093	10.067
	40	11.776	10.655	9.708
	45	11.130	10.131	9.278
	50	10.374	9.509	8.761
	55	9.488	8.766	8.134
	60	8.452	7.880	7.371
	65	7.241	6.826	6.440
	70	5.826	5.551	5.294
30	30	12.434	11.182	10.133
	35	12.010	10.838	9.854
	40	11.502	10.428	9.514
	45	10.898	9.936	9.112
	50	10.183	9.345	8.620
	55	9.338	8.634	8.018
	60	8.338	7.779	7.280
	65	7.161	6.748	6.373
	70	5.777	5.505	5.254
35	35	11.632	10.530	9.600
	40	11.175	10.157	9.291
	45	10.622	9.702	8.913
	50	9.955	9.149	8.450
	55	9.156	8.476	7.879

TABLE VII. continued.

Age of the youngest.	Age of the eldest.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
35	60	8.202	7.658	7.172
	65	7.066	6.662	6.294
	70	5.718	5.450	5.203
40	40	10.777	9.826	9.014
	45	10.283	9.418	8.671
	50	9.677	8.911	8.244
	55	8.936	8.283	7.710
	60	8.038	7.510	7.039
	65	6.951	6.556	6.198
	70	5.646	5.383	5.141
45	45	9.863	9.063	8.370
	50	9.331	8.619	7.987
	55	8.662	8.044	7.500
	60	7.831	7.332	6.875
	65	6.807	6.425	6.080
	70	5.556	5.300	5.063
50	50	8.892	8.235	7.660
	55	8.312	7.738	7.230
	60	7.568	7.091	6.664
	65	6.623	6.258	5.926
	70	5.442	5.193	4.964
55	55	7.849	7.332	6.873
	60	7.220	6.781	6.386
	65	6.379	6.036	5.724
	70	5.201	5.053	4.833
60	60	6.737	6.351	6.001
	65	6.043	5.730	5.444
	70	5.081	4.858	4.653
65	65	5.547	5.277	5.031
	70	4.773	4.571	4.385
70	70	4.270	4.104	3.952

TABLE VIII.

Shewing the Probabilities of Life at NORWICH. See page 98 in this Volume.

Ages.	Persons living.	Decr. of Life	Ages.	Persons living.	Decr. of Life	Ages.	Persons living.	Decr. of Life
0	1185	320	32	392	6	63	174	9
1	865	160	33	386	6	64	165	9
2	705	60	34	380	6	65	156	9
3	645	32	35	374	6	66	147	9
4	613	23	36	368	6	67	138	9
5	590	20	37	362	6	68	129	9
6	570	16	38	356	6	69	120	9
7	554	13	39	350	7	70	111	9
8	541	11	40	343	6	71	102	8
9	530	9	41	337	6	72	94	8
10	521	7	42	331	6	73	86	8
11	514	6	43	325	7	74	78	8
12	508	6	44	318	7	75	70	8
13	502	5	45	311	7	76	62	7
14	497	5	46	304	7	77	55	7
15	492	5	47	297	7	78	48	6
16	487	5	48	290	7	79	42	5
17	482	5	49	283	7	80	37	5
18	477	5	50	276	7	81	32	4
19	472	5	51	269	7	82	28	4
20	467	6	52	262	7	83	24	4
21	461	6	53	255	8	84	20	3
22	455	6	54	247	8	85	17	3
23	449	6	55	239	8	86	14	3
24	443	6	56	231	8	87	11	2
25	437	6	57	223	8	88	9	2
26	431	7	58	215	8	89	7	2
27	424	7	59	207	8	90	5	2
28	417	7	60	199	8	91	3	2
29	410	6	61	191	8	92	1	1
30	404	6	62	183	9	93	1	1
31	398	6						

TABLE IX.

Shewing the Probability of the Duration of Life in LONDON, deduced by Mr. *Simpson* from Observations on the Bills of Mortality in LONDON for 10 years, from 1728 to 1737.

Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.
0	1000	320	27	321	6	54	135	6
1	680	133	28	315	7	55	129	6
2	547	51	29	308	7	56	123	6
3	496	27	30	301	7	57	117	5
4	469	17	31	294	7	58	112	5
5	452	12	32	287	7	59	107	5
6	440	10	33	280	7	60	102	5
7	430	8	34	273	7	61	97	5
8	422	7	35	266	7	62	92	5
9	415	5	36	259	7	63	87	5
10	410	5	37	252	7	64	82	5
11	405	5	38	245	8	65	77	5
12	400	5	39	237	8	66	72	5
13	395	5	40	229	7	67	67	5
14	390	5	41	222	8	68	62	4
15	385	5	42	214	8	69	58	4
16	380	5	43	206	7	70	54	4
17	375	5	44	199	7	71	50	4
18	370	5	45	192	7	72	46	4
19	365	5	46	185	7	73	42	3
20	360	5	47	178	7	74	39	3
21	355	5	48	171	6	75	36	3
22	350	5	49	165	6	76	33	3
23	345	6	50	159	6	77	30	3
24	339	6	51	153	6	78	27	2
25	333	6	52	147	6	79	25	
26	327	6	53	141	6			

TABLE X.

Shewing the *Expectations* of life in LONDON, according to the preceding Table. See Mr. *Simpson's Select Exercises*, p. 255.

Age.	Expectation.	Age.	Expectation.	Age.	Expectation.
0	19.2	27	25.1	54	14.5
1	27.0	28	24.6	55	14.2
2	32.0	29	24.1	56	13.8
3	34.0	30	23.6	57	13.4
4	35.6	31	23.1	58	13.1
5	36.0	32	22.7	59	12.7
6	36.0	33	22.3	60	12.4
7	35.8	34	21.9	61	12.0
8	35.6	35	21.5	62	11.6
9	35.2	36	21.1	63	11.2
10	34.8	37	20.7	64	10.8
11	34.3	38	20.3	65	10.5
12	33.7	39	19.9	66	10.1
13	33.1	40	19.6	67	9.8
14	32.5	41	19.2	68	9.4
15	31.9	42	18.8	69	9.1
16	31.3	43	18.5	70	8.8
17	30.7	44	18.1	71	8.4
18	30.1	45	17.8	72	8.1
19	29.5	46	17.4	73	7.8
20	28.9	47	17.0	74	7.5
21	28.3	48	16.7	75	7.2
22	27.7	49	16.3	76	6.8
23	27.2	50	16.0	77	6.4
24	26.6	51	15.6	78	6.0
25	26.1	52	15.2	79	5.5
26	25.6	53	14.9	80	5.0

TABLE LVII.

Shewing the Value of Annuity on *One* Life, according to the Probabilities of Life in LONDON. See Mr. *Simpson's Select Exercises,* p. 260.

Age.	Yrs. purchase at 3 per Cent.	Yrs. purchase at 4 per Cent.	Yrs. purchase at 5 per Cent.	Age.	Yrs. purchase at 3 per Cent.	Yrs. purchase at 4 per Cent.	Yrs. purchase at 5 per Cent.	Age.	Yrs. purchase at 3 per Cent.	Yrs. purchase at 4 per Cent.	Yrs. purchase at 5 per Cent.
6	18.8	16.2	14.1	31	14.8	12.9	11.4	56	10.1	9.1	8.4
7	18.9	16.3	14.2	32	14.6	12.7	11.3	57	9.9	8.9	8.2
8	19.0	16.4	14.3	33	14.4	12.6	11.2	58	9.6	8.7	8.1
9	19.0	16.4	14.3	34	14.2	12.4	11.0	59	9.4	8.6	8.0
10	19.0	16.4	14.3	35	14.1	12.3	10.9	60	9.2	8.4	7.9
11	19.0	16.4	14.3	36	13.9	12.1	10.8	61	8.9	8.2	7.7
12	18.9	16.3	14.2	37	13.7	11.9	10.6	62	8.7	8.1	7.6
13	18.7	16.2	14.1	38	13.5	11.8	10.5	63	8.5	7.9	7.4
14	18.5	16.0	14.0	39	13.3	11.6	10.4	64	8.3	7.7	7.3
15	18.3	15.8	13.9	40	13.2	11.5	10.3	65	8.0	7.5	7.1
16	18.1	15.6	13.7	41	13.0	11.4	10.2	66	7.8	7.3	6.9
17	17.9	15.4	13.5	42	12.8	11.2	10.1	67	7.6	7.1	6.7
18	17.6	15.2	13.4	43	12.6	11.1	10.0	68	7.4	6.9	6.6
19	17.4	15.0	13.2	44	12.5	11.0	9.9	69	7.1	6.7	6.4
20	17.2	14.8	13.0	45	12.3	10.8	9.8	70	6.9	6.5	6.2
21	17.0	14.7	12.9	46	12.1	10.7	9.7	71	6.7	6.3	6.0
22	16.8	14.5	12.7	47	11.9	10.5	9.5	72	6.5	6.1	5.8
23	16.5	14.3	12.6	48	11.8	10.4	9.4	73	6.2	5.9	5.6
24	16.3	14.1	12.4	49	11.6	10.2	9.3	74	5.9	5.6	5.4
25	16.1	14.0	12.3	50	11.4	10.1	9.2	75	5.6	5.4	5.2
26	15.9	13.8	12.1	51	11.2	9.9	9.0				
27	15.6	13.6	12.0	52	11.0	9.8	8.9				
28	15.4	13.4	11.8	53	10.7	9.6	8.8				
29	15.2	13.2	11.7	54	10.5	9.4	8.6				
30	15.0	13.1	11.6	55	10.3	9.3	8.5				

TABLE XII.

Shewing the Value of an Annuity on the joint Continuance of Two Lives according to the Probabilities of Life in London. See Mr. *Simpson's Select Exercises,* p. 266.

Age of the youngest.	Age of the eldest.	Value at 3 per Cent.	Value at 4 per Cent	Value at 5 per Cent.
10	10	14.7	13.0	11.6
	15	14.3	12.7	11.3
	20	13.8	12.2	10.8
	25	13.1	11.6	10.2
	30	12.3	10.9	9.7
	35	11.5	10.2	9.1
	40	10.7	9.6	8.6
	45	10.0	9.0	8.1
	50	9.3	8.4	7.6
	55	8.6	7.8	7.1
	60	7.8	7.2	6.6
	65	6.9	6.5	6.1
	70	6.1	5.8	5.5
	75	5.3	5.1	4.9
15	15	13.9	12.3	11.0
	20	13.3	11.8	10.5
	25	12.6	11.2	10.1
	30	11.9	10.6	9.5
	35	11.2	10.0	9.0
	40	10.4	9.4	8.5
	45	9.6	8.8	8.0
	50	8.9	8.2	7.5
	55	8.2	7.6	7.0
	60	7.5	7.0	6.5
	65	6.8	6.4	6.0
	70	6.0	5.7	5.4
	75	5.2	5.0	4.8

Age of the youngest.	Age of the eldest.	Value at 3 per Cent.	Value at 4 per Cent.	Value a 5 perCent
20	20	12.8	11.3	10.1
	25	12.2	10.8	9.7
	30	11.6	10.3	9.2
	35	10.9	9.8	8.8
	40	10.2	9.2	8.4
	45	9.5	8.6	7.9
	50	8.8	8.0	7.4
	55	8.1	7.5	6.9
	60	7.4	6.9	6.4
	65	6.7	6.3	5.9
	70	6.0	5.7	5.4
	75	5.2	5.0	4.8
25	25	11.8	10.5	9.4
	30	11.3	10.1	9.0
	35	10.7	9.6	8.6
	40	10.0	9.1	8.2
	45	9.4	8.5	7.8
	50	8.7	7.9	7.3
	55	8.0	7.4	6.8
	60	7.3	6.8	6.3
	65	6.6	6.2	5.8
	70	5.9	5.6	5.3
	75	5.1	4.9	4.7
30	30	10.8	9.6	8.0
	35	10.3	9.2	8.3
	40	9.7	8.8	8.0

TABLE XII. continued.

Age of the youngest.	Age of the eldest.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
30	45	9.1	8.3	7.6
	50	8.5	7.8	7.2
	55	7.9	7.3	6.7
	60	7.2	6.7	6.2
	65	6.5	6.1	5.7
	70	5.8	5.5	5.2
	75	5.1	4.9	4.7
35	35	9.9	8.8	8.0
	40	9.4	8.5	7.7
	45	8.9	8.1	7.4
	50	8.3	7.6	7.0
	55	7.7	7.1	6.6
	60	7.1	6.5	6.1
	65	6.4	6.0	5.6
	70	5.7	5.4	5.1
	75	5.0	4.8	4.6
40	40	9.1	8.1	7.3
	45	8.7	7.8	7.1
	50	8.2	7.4	6.8
	55	7.6	6.9	6.4
	60	7.0	6.4	6.0
	65	6.4	5.9	5.5
	70	5.7	5.4	5.1
	75	5.0	4.8	4.6
45	45	8.3	7.4	6.7
	50	7.9	7.1	6.5
	55	7.4	6.7	6.2
	60	6.8	6.3	5.8
	65	6.3	5.8	5.4
	70	5.6	5.3	5.0
	75	4.9	4.7	4.5
50	50	7.6	6.8	6.2
	55	7.2	6.5	6.0
	60	6.7	6.1	5.7
	65	6.2	5.7	5.3
	70	5.5	5.2	4.9
	75	4.8	4.6	4.4
55	55	6.9	6.2	5.7
	60	6.5	5.9	5.5
	65	6.0	5.6	5.2
	70	5.4	5.1	4.8
	75	4.7	4.5	4.3
60	60	6.1	5.6	5.2
	65	5.7	5.3	4.9
	70	5.2	4.9	4.6
	75	4.6	4.4	4.2
65	65	5.4	5.0	4.7
	70	4.9	4.6	4.4
	75	4.4	4.2	4.0
70	70	4.6	4.4	4.2
	75	4.2	4.0	3.9
75	75	3.8	3.7	3.6

TABLE XIII.

Shewing the Probabilities of Life in London, on the Supposition that all who die in London were born there. Formed from the Bills, for 10 Years, from 1759 to 1768. See Essay II. page 89, &c.

Ages	Persons living.	Decr. of Life.	Age.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.
0	1000	240	31	404	9	62	132	7
1	760	99	32	395	9	63	125	7
2	661	42	33	386	9	64	118	7
3	619	29	34	377	9	65	111	7
4	590	21	35	368	9	66	104	7
5	569	13	36	359	9	67	97	7
6	556	10	37	350	9	68	90	7
7	546	7	38	341	9	69	83	7
8	539	5	39	332	10	70	76	6
9	534	4	40	322	10	71	70	6
10	530	4	41	312	10	72	64	6
11	526	4	42	302	10	73	58	5
12	522	4	43	292	10	74	53	5
13	518	3	44	282	10	75	48	5
14	515	3	45	272	10	76	43	5
15	512	3	46	262	10	77	38	5
16	509	3	47	252	10	78	33	4
17	506	3	48	242	9	79	29	4
18	503	4	49	233	9	80	25	3
19	499	5	50	224	9	81	22	3
20	494	7	51	215	9	82	19	3
21	487	8	52	206	8	83	16	3
22	479	8	53	198	8	84	13	2
23	471	8	54	190	7	85	11	2
24	463	8	55	183	7	86	9	2
25	455	8	56	176	7	87	7	2
26	447	8	57	169	7	88	5	1
27	439	8	58	162	7	89	4	1
28	431	9	59	155	8	90	3	1
29	422	9	60	147	8			
30	413	9	61	139	7			

TABLE XIV.

Shewing the true Probabilities of Life in London till the Age of 19. See Essay II. p. 92, &c.

Age.	Persons living.	Decrements of Life.
0	750	240
1	510	99
2	411	42
3	369	29
4	340	21
5	319	13
6	306	10
7	296	7
8	289	5
9	284	4
10	280	4
11	276	4
12	272	3
13	269	3
14	266	3
15	263	3
16	260	3
17	257	4
18	253	4
19	249	5
20	494	

TABLE XV.

Shewing the *true* Probabilities of Life in LONDON for all Ages, formed from the Bills for 10 Years, from 1759 to 1768. See Essay II. page 86, &c.

Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.
0	1518	486	31	404	9	62	132	7
1	1032	200	32	395	9	63	125	7
2	832	85	33	386	9	64	118	7
3	747	59	34	377	9	65	111	7
4	688	42	35	368	9	66	104	7
5	646	23	36	359	9	67	97	7
6	623	20	37	350	9	68	90	7
7	603	14	38	341	9	69	83	7
8	589	12	39	332	10	70	76	6
9	577	10	40	322	10	71	70	6
10	567	9	41	312	10	72	64	6
11	558	9	42	302	10	73	58	5
12	549	8	43	292	10	74	53	5
13	541	7	44	282	10	75	48	5
14	534	6	45	272	10	76	43	5
15	528	6	46	262	10	77	38	5
16	522	7	47	252	10	78	33	4
17	515	7	48	242	9	79	29	4
18	508	7	49	233	9	80	25	3
19	501	7	50	224	9	81	22	3
20	494	7	51	215	9	82	19	3
21	487	8	52	206	8	83	16	3
22	479	8	53	198	8	84	13	2
23	471	8	54	190	7	85	11	2
24	463	8	55	183	7	86	9	2
25	455	8	56	176	7	87	7	2
26	447	8	57	169	7	88	5	1
27	439	8	58	162	7	89	4	1
28	431	9	59	155	8	90	3.	1
29	422	9	60	147	8			
30	413	9	61	139	7			

TABLE XVI.

Shewing the Probabilities of the Duration of Human Life in LONDON, and formed from the Bills for ten Years, from 1771 to 1780.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	28452	9018	34	7049	190	68	1831	130
1	19434	3000	35	7759	190	69	1701	130
2	16434	1536	36	7569	190	70	1571	130
3	14898	1200	37	7379	190	71	1441	120
4	13698	800	38	7189	190	72	1321	120
5	12898	500	39	6999	200	73	1201	120
6	12398	318	40	6799	210	74	1081	110
7	12080	210	41	6589	210	75	971	110
8	11870	160	42	6379	210	76	861	100
9	11710	130	43	6169	210	77	761	100
10	11580	130	44	5959	210	78	661	90
11	11450	130	45	5749	200	79	571	80
12	11320	130	46	5549	200	80	491	70
13	11190	130	47	5349	200	81	421	60
14	11060	130	48	5149	200	82	361	52
15	10930	130	49	4949	193	83	309	48
16	10800	130	50	4756	190	84	261	44
17	10670	130	51	4566	190	85	217	40
18	10540	135	52	4376	180	86	177	35
19	10405	135	53	4196	180	87	142	30
20	10270	140	54	4016	180	88	112	25
21	10130	150	55	3836	170	89	87	20
22	9980	155	56	3666	170	90	67	15
23	9825	155	57	3496	165	91	52	12
24	9670	160	58	3331	160	92	40	10
25	9510	160	59	3171	160	93	30	8
26	9350	160	60	3011	160	94	22	7
27	9190	170	61	2851	150	95	15	6
28	9020	170	62	2701	150	96	9	5
29	8850	171	63	2551	150	97	4	3
30	8679	180	64	2401	150	98	1	1
31	8499	180	65	2251	140			
32	83 9	180	66	2111	140	Tot.	572781	28452
33	8139	190	67	1971	140			

Remarks *on the preceding Table.*

According to this Table, the numbers dying in every decad of life from 20 to old age, are the very numbers given by the bills. For instance. The sum of the decrements in the Table between 20 and 30, between 30 and 40, between 40 and 50, between 50 and 60, between 60 and 70, between 70 and 80, between 80 and 90, and above 90, are 1591, 1880, 2043, 1745, 1440, 1080, 423, and 68, respectively; and these are the average numbers which, according to the bills, have died annually in *London*, in these several divisions of life, from 1771 to 1780. The sum of all these numbers is 10,270, which, therefore, agreeably to the directions in the 2d Essay, p. 84, &c. is given in the Table as the number of the living at the age of 20.

The *proportions* of the decrements *before* 20, are likewise exactly the same with those given by the bills. For instance. The number (*deducting the abortive and still-born*) given by the bills as having died annually under two years of age from 1771 to 1780, is 7000; and the numbers given as having died between 2 and 5, between 5 and 10, and between 10 and 20, are 2060, 768, and 763. These decrements, according to the Table, are 12018, 3535, 1318, and 1310: which numbers are in the same proportion to one another with the former numbers; and the numbers of the living corresponding to these decrements are so adjusted, as to make the number dying annually between 8 and 16, as *small* as is consistent with any degree of credibility; that is, they have been so adjusted as to make this last number only an 86th part of the whole number living, which is a smaller proportion than Mr. *Wales* says have for 20 years died of children of the same ages in *Christ's Hospital*, though near a third reside in the country. See the note, p. 88, in this volume.

It should be observed here, that the number living *at* 20, and the proportions of the decrements *before* 20, and the probabilities of living in one division of life being obtained or assumed, all the numbers in the second column of this Table, are so far determined as to render it impossible to fall into any material error in fixing them. It is necessary to add, that though the particular decrements under two years of age, between 2 and 5, &c. are given by the bills too small; this affords no reason for concluding that their *proportions* are not given right. On the contrary; the reasons mentioned in the note, p. 99, in this volume, seem to prove they may be depended on.

The account now given shews, that most *probably* the preceding Table exhibits the probabilities of living considerably too high before the age of 20; and it does this *certainly* from 20 to 35 or 40, for the reasons explained in p. 84, 85, &c. in this Volume; and in old age it gives the probabilities of living rather higher than they are in situations the most healthful. We may, therefore, safely conclude that it exhibits the state of human life in *London* as upon the whole more favourable than it is. According to this Table, however, one half of all born in *London* die in the first four years; and the expectation of a child at birth is only 19$\frac{3}{5}$. It is farther observable, that for all ages after 20, it agrees so nearly with Table 9th formed from the bills from 1728 to 1737, and with Table 15th formed from the bills from 1759 to 1768, as to demonstrate that, for the last 50 years, there has been no change in the state of *London* which has *greatly* affected its influence on the duration of human life. This will appear from the following comparison.

Expectations of Life at	By Table 9th	By Table 15th	By Table 16th
20	28.9	29.3	29.6
25	26.1	26.6	26.7
30	23.6	24.1	24.1
35	21.5	21.7	21.6
40	19.6	19.5	19.3
45	17.8	17.6	17.4
50	16.0	15.9	15.5
55	14.2	13.9	13.6
60	12.4	11.7	11.7
65	10.5	9.7	9.8
70	8.8	8.0	7.9

It cannot but be reckoned remarkable, that the duration of human life in *London* should come out by the bills so nearly the same at the three periods for which the Table mentioned in this comparison were formed. A small difference, indeed, appears from the age of 20 to 30 in favour of *London* in its present state; but it must not be depended on as a reason for concluding that *London* is now less prejudicial to health than it was; for Mr. *Simpson*, in forming Table 9th, did not take, as I have done, the decrements of life between 20 and 30 exactly from the bills, but extended his corrections very properly to this division of life as well as those preceding it; and had I done the same, the expectations for 20 and 25, deduced from Tables 15th and 16th, would have been less than they are.——With respect to all ages before 20, nothing certain can be collected from these Tables. The last makes, indeed, one half of the children born to survive 4 years of age, whereas the other Tables make one half live only to three years of age; but it should be recollected, that this difference has been occasioned by the act of parliament passed in 1767, and mentioned in the note, p. 24, in this Volume, requiring all parish children to be sent into the country for six years. If only a thousand burials of infants under two years of age, and born in *London*, have by this act been taken out of the bills, which used to be, and ought to be, included in them, it will follow that one half of the children born in *London* do not live to three years of age; and a table constructed in the manner of the last table, would have shewn this as well as the other tables.——Mr. *Howlett* tells us, that this deficiency amounts to 2100; and were this true, it would follow that *London* is now more fatal to children than ever it was. But I have learnt not to rely on Mr. *Howlett's* accounts. See the note in p. 24 in this Volume.

This Table would have been very nearly the same, had it been formed from the bills for the last *five* years from 1777 to 1781, instead of being formed as it is from the bills for ten years from 1771 to 1780.

TABLE XVII.

Shewing the Probabilities of the Duration of Human Life at all Ages, formed from the Register of Mortality at *Northampton*, for 46 Years from 1735 to 1780.

Age.	Living	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	11650	1340	31	4310	75	65	1632	80
3 months	10310	554	32	4235	75	66	1552	80
6 months	9756	553	33	4160	75	67	1472	80
9 months	9203	553	34	4085	75	68	1392	80
1 Year	8650	1367	35	4010	75	69	1312	80
2 Years	7283	502	36	3935	75	70	1232	80
3	6781	335	37	3860	75	71	1152	80
4	6446	197	38	3785	75	72	1072	80
5	6249	184	39	3710	75	73	992	80
6	6065	140	40	3635	76	74	912	80
7	5925	110	41	3559	77	75	832	80
8	5815	80	42	3482	78	76	752	77
9	5735	60	43	3404	78	77	675	73
10	5675	52	44	3326	78	78	602	68
11	5623	50	45	3248	78	79	534	65
12	5573	50	46	3170	78	80	469	63
13	5523	50	47	3092	78	81	406	60
14	5473	50	48	3014	78	82	346	57
15	5423	50	49	2936	79	83	289	55
16	5373	53	50	2857	81	84	234	48
17	5320	58	51	2776	82	85	186	41
18	5262	63	52	2694	82	86	145	34
19	5199	67	53	2612	82	87	111	28
20	5132	72	54	2530	82	88	83	21
21	5060	75	55	2448	82	89	62	16
22	4985	75	56	2366	82	90	46	12
23	4910	75	57	2284	82	91	34	10
24	4835	75	58	2202	82	92	24	8
25	4760	75	59	2120	82	93	16	7
26	4685	75	60	2038	82	94	9	5
27	4610	75	61	1956	82	95	4	3
28	4535	75	62	1874	81	96	1	1
29	4460	75	63	1793	81			
30	4385	75	64	1712	80	Total	299198	11650

N. B. The decrements in this Table for the four quarters of the first year of life, are given nearly in conformity to the *Chester* register of mortality (see Table 42d in this collection); and the same is true of the decrements at 3 and 4 years of age, the *Northampton* register affording no direction at these ages, because it gives only the totals of deaths under two years of age, and between two and five. Many more observations on the method I have pursued in forming this Table, may be found in the Postscript to the 4th Chapter in the first Volume, p. 210, &c. and in the second Essay in this Volume, p. 97, &c.

It is proper to add, that it has been taken to be the foundation and guide of the business transacted by the Society in CHATHAM PLACE, for *Equitable Assurances on Lives and Survivorships*; and that the Tables of this Society, which will be given hereafter, together with the Tables of the values of single and joint lives from Table XIX. to Table XXXIV. have been all calculated from it.

TABLE XVIII.

Shewing the Expectations of Human Life at every Age, deduced from the *Northampton* Table of Observations.

Ages.	Expectat.	Ages.	Expectat.	Ages	Expectat.	Ages	Expectat.
0	25.18	25	30.85	50	17.99	75	6.54
1	32.74	26	30.33	51	17.50	76	6.18
2	37.79	27	29.82	52	17.02	77	5.83
3	39.55	28	29.30	53	16.54	78	5.48
4	40.58	29	28.79	54	16.06	79	5.11
5	40.84	30	28.27	55	15.58	80	4.75
6	41.07	31	27.76	56	15.10	81	4.41
7	41.03	32	27.24	57	14.63	82	4.09
8	40.79	33	26.72	58	14.15	83	3.80
9	40.36	34	26.20	59	13.68	84	3.58
10	39.78	35	25.68	60	13.21	85	3.37
11	39.14	36	25.16	61	12.75	86	3.19
12	38.49	37	24.64	62	12.28	87	3.01
13	37.83	38	24.12	63	11.81	88	2.86
14	37.17	39	23.60	64	11.35	89	2.66
15	36.51	40	23.08	65	10.88	90	2.41
16	35.85	41	22.56	66	10.42	91	2.09
17	35.20	42	22.04	67	9.96	92	1.75
18	34.58	43	21.54	68	9.50	93	1.37
19	33.99	44	21.03	69	9.05	94	1.05
20	33.43	45	20.52	70	8.60	95	0.75
21	32.90	46	20.02	71	8.17	96	0.50
22	32.39	47	19.51	72	7.74		
23.	31.88	48	19.00	73	7.33		
24	31.36	49	18.49	74	6.92		

TABLE XIX.

Shewing the Value of an Annuity on a single Life at every Age, according to the Probabilities of the Duration of Human Life at NORTHAMPTON. See Table XVII. p. 311.

Ages.	Value at 3 per cent	Value at 4 per cent.	Value at 5 per cent	Value at 6 per cent	Value at 7 per cent	Value at 8 per cent.
Birth		10.327	8.863			
½ year		13.008	11.274			
1	16.021	13.465	11.563	10.107	8.963	8.046
2	18.599	15.633	13.420	11.724	10.391	9.321
3	19.575	16.462	14.135	12.348	10.941	9.812
4	20.210	17.010	14.613	12.769	11.315	10.147
5	20.473	17.248	14.827	12.962	11.489	10.304
6	20.727	17.482	15.041	13.150	11.666	10.466
7	20.853	17.611	15.166	13.275	11.777	10 570
8	20.885	17 662	15.226	13.337	11.840	10.631
9	20 812	17.625	15.210	13.335	11.846	10.641
10	20.663	17 523	15.139	13.285	11.809	10.614
11	20.480	17.393	15.043	13.212	11.752	10.569
12	20.283	17.251	14.937	13.130	11.687	10.517
13	20.081	17.103	14.826	13.044	11.618	10.461
14	19.872	16.950	14.710	12.953	11.545	10.401
15	19.657	16.791	14 588	12.857	11.467	10.337
16	19.435	16.625	14.460	12.755	11.384	10.268
17	19.218	16.462	14.334	12.655	11.302	10.200
18	19.013	16.309	14.217	12.562	11.226	10.137
19	18.820	16.167	14.108	12.477	11.157	10.081
20	18.638	16.033	14.007	12.398	11.094	10.030
21	18.470	15.912	13.917	12.329	11.042	9.986
22	18.311	15.797	13.833	12.265	10.993	9.947
23	18.148	15.680	13.746	12.200	10.942	9.907
24	17.983	15.560	13.658	12.132	10.890	9.865
25	17.814	15.438	13.567	12.063	10.836	9.823
26	17.642	15.312	13.473	11.992	10.780	9.778
27	17.467	15.184	13.377	11.917	10.723	9.732
28	17.289	15.053	13.278	11.841	10.663	9.685
29	17.107	14 918	13.177	11.763	10 602	9.635
30	16.922	14.781	13.072	11.682	10.539	9.584
31	16.732	14.639	12.965	11.598	10.473	9.531
39	16.540	14.495	12.854	11.512	10.404	9.476
33	16.343	14.347	12.740	11.423	10.333	9.418
34	16.142	14.195	12.623	11.331	10.260	9.359

TABLE XIX. continued.

Ages.	Value at 3 per cent	Value at 4 per cent	Value at 5 per cent	Value at 6 per cent	Value at 7 per cent.	Value at 8 per cent.
35	15.938	14.039	12.502	11.236	10.183	9.296
36	15.729	13.880	12.377	11.137	10.104	9.231
37	15.515	13.716	12.249	11.035	10.021	9.164
38	15.298	13.548	12.116	10.929	9.935	9.093
39	15.075	13.375	11.979	10.819	9.845	9.019
40	14.848	13.197	11.837	10.705	9.752	8.941
41	14.620	13.018	11.695	10.589	9.657	8.863
42	14.391	12.838	11.551	10.473	9.562	8.783
43	14.162	12.657	11.407	10.356	9.466	8.703
44	13.929	12.472	11.258	10.235	9.366	8.620
45	13.692	12.283	11.105	10.110	9.262	8.533
46	13.450	12.089	10.947	9.980	9.154	8.443
47	13.203	11.890	10.784	9.846	9.042	8.348
48	12.951	11.685	10.616	9.707	8.925	8.249
49	12.693	11.475	10.443	9.563	8.804	8.146
50	12.436	11.264	10.269	9.417	8.681	8.041
51	12.183	11.057	10.097	9.273	8.559	7.937
52	11.930	10.849	9.925	9.129	8.437	7.833
53	11.674	10.637	9.748	8.980	8.311	7.725
54	11.414	10.421	9.567	8.827	8.181	7.614
55	11.150	10.201	9.382	8.670	8.047	7.499
56	10.882	9.977	9.193	8.509	7.909	7.379
57	10.611	9.749	8.999	8.343	7.766	7.256
58	10.337	9.516	8.801	8.173	7.619	7.128
59	10.058	9.280	8.599	7.999	7.468	6.996
60	9.777	9.039	8.392	7.820	7.312	6.860
61	9.493	8.795	8.181	7.637	7.152	6.719
62	9.205	8.547	7.966	7.449	6.988	6.574
63	8.910	8.291	7.742	7.253	6.815	6.421
64	8.611	8.030	7.514	7.052	6.637	6.262
65	8.304	7.761	7.276	6.841	6.449	6.095
66	7.994	7.488	7.034	6.625	6.256	5.922
67	7.682	7.211	6.787	6.405	6.058	5.743
68	7.367	6.930	6.536	6.179	5.855	5.559
69	7.051	6.647	6.281	5.949	5.646	5.370
70	6.734	6.361	6.023	5.716	5.434	5.176
71	6.418	6.075	5.764	5.479	5.218	4.978
72	6.103	5.790	5.504	5.241	5.000	4.778
73	5.794	5.507	5.245	5.004	4.781	4.576
74	5.491	5.230	4.990	4.769	4.565	4.375

TABLE XIX. continued.

Ages.	Value at 3 per cent	Value at 4 per cent	Value at 5 per cent	Value at 6 per cent	Value at 7 per cent.	Value at 8 per cent.
75	5.199	4.962	4.744	4.542	4.354	4.180
76	4.925	4.710	4.511	4.326	4.154	3.994
77	4.652	4.457	4.277	4.109	3.952	3.806
78	4.372	4.197	4.035	3.884	3.742	3.609
79	4.077	3.921	3.776	3.641	3.514	3.394
80	3.781	3.643	3.515	3.394	3.281	3.174
81	3.499	3.377	3.263	3.156	3.055	2.960
82	3.229	3.122	3.020	2.926	2.836	2.751
83	2.982	2.887	2.797	2.713	2.632	2.557
84	2.793	2.708	2.627	2.551	2.479	2.410
85	2.620	2.543	2.471	2.402	2.337	2.275
86	2.462	2.393	2.328	2,266	2.207	2.151
87	2.312	2.251	2.193	2.138	2.085	2.035
88	2.185	2.131	2.080	2.031	1.984	1.939
89	2.013	1.967	1.924	1.882	1.842	1.803
90	1.794	1.758	1.723	1.689	1.656	1.625
91	1.501	1.474	1.447	1.422	1.398	1.374
92	1.190	1.171	1.153	1.136	1.118	1.102
93	0.839	0.827	0.816	0.806	0.795	0.785
94	0.536	0.530	0.524	0.518	0.512	0.507
95	0.242	0.240	0.238	0.236	0.234	0.232
96	0.000	0.000	0.000	0.000	0.000	0.000

The values of annuities in the preceding Table (and in all the other Tables in this collection), suppose the payments to be made *yearly*, and to begin at the end of a year; except in the single instance of an annuity on a life aged *half* a year, the value of which is given in the preceding Table, on the suppositions that the first payment is to be a half-yearly one made at the end of half a year, and that all the subsequent payments are yearly ones.

If all the payments are to be *half-yearly* payments, and to be made at the end of every *half* year from the time of purchase, their value will be increased about *one-fifth* of a year's purchase. When the *tabular* value (that is, the value of an annuity to commence at the end of a year, and payable yearly) is greater than 11 or 12 years purchase, this addition will give somewhat *more*, and when less it will give somewhat *less* than the value of the same annuity payable *half-yearly*; but in no instance will the error exceed a 20th of a year's purchase.

TABLE XX.

Shewing the Value of an Annuity on the *joint Continuance* of Two Lives, having the same common Age, according to the *Northampton* Table of Observations. See Table XVII. p. 311.

Difference of Age 0.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent
1- 1	9.491	8.252	7.287	6.515
2- 2	12.789	11.107	9.793	8.741
3- 3	14.196	12.325	10.862	9.689
4- 4	15.181	13.185	11.621	10.365
5- 5	15.638	13.591	11.984	10.691
6- 6	16.099	14.005	12.358	11.031
7- 7	16.375	14.224	12.596	11.251
8- 8	16.510	14.399	12.731	11.382
9- 9	16.483	14.396	12.744	11.404
10-10	16.339	14.277	12.665	11.345
11-11	16.142	14.133	12.546	11.249
12-12	15.926	13.966	12.411	11.139
13-13	15.702	13.789	12.268	11.023
14-14	15.470	13.604	12.118	10.899
15-15	15.229	13.411	11.960	10.767
16-16	14.979	13.212	11.793	10.626
17-17	14.737	13.019	11.630	10.489
18-18	14.516	12.841	11.483	10.365
19-19	14.316	12.679	11.351	10.255
20-20	14.133	12.535	11.232	10.156

TABLE XX. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
21-21	13.974	12.409	11.131	10.074
22-22	13.830	12.293	11.042	10.002
23-23	13.688	12.179	10.951	9.928
24-24	13.534	12.062	10.858	9.858
25-25	13.383	11.944	10.764	9.776
26-26	13.230	11.822	10.667	9.697
27-27	13.074	11.699	10.567	9.616
28-28	12.915	11.573	10.466	9.533
29-29	12.754	11.445	10.362	9.448
30-30	12.589	11.313	10.255	9.360
31-31	12.422	11.179	10.146	9.270
32-32	12.252	11.042	10.034	9.178
33-33	12.079	10.902	9.919	9.082
34-34	11.902	10.759	9.801	8.984
35-35	11.722	10.612	9.680	8.883
36-36	11.539	10.462	9.555	8.778
37-37	11.351	10.307	9.427	8.670
38-38	11.160	10.149	9.294	8.558
39-39	10.964	9.986	9.158	8.442
40-40	10.764	9.820	9.016	8.322
41-41	10.565	9.654	8.876	8.202
42-42	10.369	9.491	8.737	8.083
43-43	10.175	9.326	8.599	7.965
44-44	9.978	9.160	8.457	7.843
45-45	9.776	8.990	8.312	7.718
46-46	9.571	8.815	8.162	7.589
47-47	9.362	8.637	8.008	7.455
48-48	9.149	8.453	7.849	7.316

TABLE XX. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
49-49	8.931	8.266	7.686	7.173
50-50	8.714	8.081	7.522	7.030
51-51	8.507	7.900	7.366	6.893
52-52	8.304	7.723	7.213	6.758
53-53	8.099	7.544	7.056	6.620
54-54	7.891	7.362	6.897	6.480
55-55	7.681	7.179	6.785	6.336
56-56	7.470	6.993	6.571	6.190
57-57	7.256	6.805	6.404	6.041
58-58	7.041	6.614	6.234	5.890
59-59	6.824	6.421	6.062	5.735
60-60	6.606	6.226	5.888	5.579
61-61	6.387	6.030	5.712	5.420
62-62	6.166	5.831	5.533	5.259
63-63	5.938	5.626	5.347	5.089
64-64	5.709	5.417	5.158	4.917
65-65	5.471	5.201	4.960	4.736
66-66	5.231	4.982	4.759	4.551
67-67	4.990	4.760	4.555	4.368
68-68	4.747	4.537	4.348	4.171
69-69	4.504	4.312	4.140	3.977
70-70	4.261	4.087	3.930	3.781
71-71	4.020	3.862	3.719	3.584
72-72	3.781	3.639	3.510	3.387
73-73	3.548	3.421	3.304	3.193
74-74	3.324	3.211	3.105	3.005
75-75	3.114	3.015	2.917	2.827
76-76	2.920	2.833	2.750	2.668

TABLE XX. continued.

Ages.	Value at 3 per Ct.	Value at 4 per Ct.	Value at 5 per Ct.	Value at 6 per Ct.
77-77	2.741	2.656	2.583	2.511
78-78	2.550	2.470	2.410	2.346
79-79	2.338	2.271	2.217	2.161
80-80	2.122	2.068	2.018	1.969
81-81	1.917	1.869	1.827	1.786
82-82	1.719	1.681	1.642	1.606
83-83	1.538	1.510	1.472	1.441
84-84	1.416	1.387	1.357	1.330
85-85	1.309	1.339	1.256	1.232
86-86	1.218	1.195	1.171	1.149
87-87	1.141	1.124	1.098	1.078
88-88	1.103	1.030	1.063	1.044
89-89	1.036	1.015	1.001	0.984
90-90	0.938	0.922	0.909	0.895
91-91	0.769	0.756	0.748	0.737
92-92	0.591	0.583	0.576	0.569
93-93	0.369	0.365	0.361	0.357
94-94	0.203	0.201	0.199	0.197
95-95	0.060	0.060	0.059	0.058
96-96	0.000	0.000	0.000	0.000

TABLE XXI.

Shewing the Value of an Annuity on the *joint* Continuance of Two Lives, according to the *Northampton* Table of Observations. See Table XVII.

Difference of Age *five* Years.

Ages.	Value at 3 per Ct.	Value at 4 per Ct.	Value at 5 per Ct.	Value at 6 per Ct.
1-6	12.347	10.741	9.479	8.467
2-7	14.461	12.581	11.100	9.911
3-8	15.300	13.319	11.755	10.498
4-9	15.809	13.775	12.165	10.869
5-10	15.974	13.933	12.315	11.010
6-11	16.110	14.068	12.447	11.136
7-12	16.137	14.111	12.498	11.192
8-13	16.089	14.089	12.492	11.197
9-14	15.957	13.992	12.421	11.144
10-15	15.762	13.841	12.302	11.048
11-16	15.538	13.664	12.158	10.929
12-17	15.308	13.480	12.009	10.805
13-18	15.086	13.303	11.864	10.685
14-19	14.870	13.130	11.723	10.568
15-20	14.660	12.961	11.585	10.453
16-21	14.457	12.799	11.452	10.342
17-22	14.265	12.646	11.327	10.239
18-23	14.082	12.500	11.209	10.140
19-24	13 908	12.361	11.096	10.048
20-25	13.741	12.229	10.989	9.960
21-26	13.584	12.105	10.890	9.879
22-27	13.433	11.987	10.796	9.803

TABLE XXI. continued.

Ages.	Value at 3 per Ct.	Value at 4 per Ct.	Value at 5 per Ct.	Value at 6 per Ct.
23-28	13.280	11.866	10.699	9.724
24-29	13.124	11.743	10.600	9.643
25-30	12.966	11.618	10.499	9.561
26-31	12.805	11.489	10.396	9.476
27-32	12.641	11.359	10.289	9.389
28-33	12.474	11.225	10.181	9.299
29-34	12.304	11.088	10.069	9.207
30-35	12.131	10.948	9.954	9.112
31-36	11.955	10.805	9.837	9.014
32-37	11.775	10.659	9.716	8.913
33-38	11.592	10.508	9.591	8.808
34-39	11.404	10.354	9.463	8.701
35-40	11.213	10.196	9.331	8.589
36-41	11.021	10.037	9.198	8.476
37-42	10.828	9.877	9.062	8.362
38-43	10.635	9.716	8.927	8.246
39-44	10.437	9.550	8.787	8.127
40-45	10.236	9.381	8.643	8.003
41-46	10.033	9.210	8.497	7.878
42-47	9.829	9.037	8.350	7.751
43-48	9.624	8.862	8.200	7.621
44-49	9.414	8.683	8.046	7.488
45-50	9.204	8.508	7.891	7.353
46-51	8.997	8.326	7.737	7.219
47-52	8.790	8.147	7.582	7.084
48-53	8.579	7.965	7.424	6.945
49-54	8.366	7.780	7.262	6.802
50-55	8.152	7.593	7.098	6.658

TABLE XXI. continued.

Ages.	Value at 3 per Ct.	Value at 4 per Ct.	Value at 5 per Ct.	Value at 6 per Ct.
51-56	7.941	7.409	6.936	6.515
52-57	7.730	7.225	6.774	6.371
63-58	7.518	7.039	6.609	6.225
54-59	7.304	6.850	6.442	6.076
55-60	7.088	6.659	6.272	5.924
56-61	6.870	6.465	6.100	5.770
57-62	6.651	6.270	5.925	5.613
58-63	6.427	6.070	5.744	5.450
59-64	6.201	5.867	5.561	5.284
60-65	5.970	5.658	5.372	5.112
61-66	5.737	5.447	5.180	4.938
62-67	5.503	5.285	4.986	4.760
63-68	5.265	5.017	4.786	4.576
64-69	5.025	4.798	4.585	4.390
65-70	4.783	4.573	4.378	4.199
66-71	4.540	4.349	4.169	4.005
67-72	4.298	4.124	3.960	3.811
68-73	4.059	3.901	3.752	3.616
69-74	3.825	3.683	3.547	3.423
70-75	3.599	3.471	3.347	3.236
71-76	3.386	3.270	3.159	3.059
72-77	3.176	3.070	2.971	2.882
73-78	2.963	2.869	2.780	2.701
74-79	2.743	2.659	2.580	2.511
75-80	2.526	2.448	2.381	2.323
76-81	2.325	2.258	2.195	2.147
77-82	2.131	2.077	2.013	1.975
78-83	1.947	1.899	1.838	1.810

TABLE XXI. continued.

Ages.	Value at 3 per Ct.	Value at 4 per Ct.	Value at 5 per Ct.	Value at 6 per Ct.
79-84	1.793	1.751	1.750	1.672
80-85	1.645	1.608	1.573	1.539
81-86	1.511	1.478	1.447	1.417
82-87	1.385	1.356	1.329	1.303
83-88	1.284	1.259	1.235	1.212
84-89	1.188	1.164	1.145	1.124
85-90	1.074	1.054	1.038	1.021
86-91	0.921	0.902	0.892	0.879
87-92	0.756	0.738	0.734	0.725
88-93	0.562	0.554	0.547	0.541
89-94	0.377	0.373	0.369	0.365
90-95	0.179	0.177	0.175	0.174
91-96	0.000	0.000	0.000	0.000

TABLE XXII.

Shewing the Value of an Annuity on the joint Continuance of Two Lives, according to the *Northampton* Table of Observations. See Table XVII.

Difference of Age *ten* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-11	12.346	10.782	9.544	8.547
2-12	14.239	12.438	11.010	9.857
3-13	14.895	13.019	11.528	10.324
4-14	15.287	13.374	11.850	10.617
5-15	15.391	13.479	11.954	10.716
6-16	15.486	13.578	12.052	10.812
7-17	15.490	13.599	12.083	10.849
8-18	15.436	13.569	12.070	10.847
9-19	15.316	13.482	12.006	10.799
10-20	15.151	13.355	11.906	10.719
11-21	14.974	13.217	11.797	10.631
12-22	14.795	13.078	11.686	10.541
13-23	14.612	12.934	11.570	10.446
14-24	14.424	12.784	11.450	10.348
15-25	14.230	12.630	11.324	10.244
16-26	14.030	12.470	11.193	10.135
17-27	13.832	12.311	11.063	10.027
18-28	13.642	12.158	10.939	9.924
19-29	13.461	12.013	10.820	9.826
20-30	13.286	11.873	10.707	9.732
21-31	13.121	11.742	10.600	9.644

TABLE XXII. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
22-32	12.961	11.615	10.498	9.561
23-33	12.798	11.485	10.393	9.474
24-34	12.632	11.352	10.286	9.386
25-35	12.463	11.217	10.175	9.295
26-36	12.291	11.078	10.062	9.201
27-37	12.116	10.936	9.946	9.105
28-38	11.937	10.791	9.826	9.006
29-39	11.755	10.642	9.703	8.902
30-40	11.568	10.490	9.576	8.795
31-41	11.382	10.336	9.448	8.688
32-42	11.195	10.182	9.320	8.580
33-43	11.007	10.027	9.190	8.471
34-44	10.817	9.869	9.058	8.358
35-45	10.622	9.706	8.921	8.242
36-46	10.424	9.540	8.781	8.122
37-47	10.221	9.370	8.636	7.998
38-48	10.014	9.195	8.487	7.870
39-49	9.803	9.015	8.333	7.737
40-50	9.590	8.834	8.177	7.602
41-51	9.383	8.658	8.025	7.470
42-52	9.179	8.483	7.875	7.340
43-53	8.975	8.308	7.724	7.208
44-54	8.767	8.130	7.569	7.073
45-55	8.557	7.948	7.411	6.935
46-56	8.344	7.763	7.249	6.793
47-57	8.127	7.574	7.084	6.648
48-58	7.907	7.382	6.915	6.498
49-59	7.684	7.186	6.742	6.344

TABLE XXII. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
50-60	7.461	6.989	6.568	6.189
51-61	7.240	6.795	6.395	6.035
52-62	7.021	6.600	6.222	5.880
53-63	6.795	6.399	6.042	5.719
54-64	6.568	6.196	5.860	5.555
55-65	6.334	5.986	5.671	5.384
56-66	6.098	5.774	5.479	5.209
57-67	5.860	5.559	5.283	5.031
58-68	5.621	5.341	5.084	4.849
59-69	5.380	5.121	4.883	4.665
60-70	5.139	4.900	4.680	4.478
61-71	4.898	4.679	4.476	4.289
62-72	4.659	4.458	4.272	4.099
63-73	4.420	4.236	4.066	3.908
64-74	4.186	4.019	3.864	3.719
65-75	3.958	3.806	3.665	3.533
66-76	3.743	3.606	3.477	3.357
67-77	3.529	3.405	3.289	3.180
68-78	3.310	3.199	3.095	2.996
69-79	3.077	2.979	2.887	2.799
70-80	2.843	2.757	2.675	2.598
71-81	2.618	2.542	2.470	2.402
72-82	2.401	2.334	2.271	2.211
73-83	2.199	2.141	2.085	2.032
74-84	2.043	1.991	1.941	1.894
75-85	1.903	1.856	1.811	1.769
76-86	1.781	1.739	1.699	1.661
77-87	1.670	1.633	1.597	1.562

TABLE XXII. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
78-88	1.580	1.546	1.514	1.483
79-89	1.456	1.427	1.400	1.373
80-90	1.302	1.278	1.255	1.234
81-91	1.096	1.078	1.061	1.044
82-92	0.877	0.864	0.852	0.840
83-93	0.622	0.614	0.606	0.599
84-94	0.408	0.403	0.398	0.394
85-95	0.189	0.187	0.185	0.183
86-96	0.000	0.000	0.000	0.000

TABLE XXIII.

Shewing the Value of an Annuity on the joint continuance of Two Lives, according to the *Northampton* Table of Observations. See Table XVII.

Difference of Age *fifteen* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-16	11.864	10.406	9.243	8.301
2-17	13.659	11.981	10.642	9.555
3-18	14.277	12.531	11.134	9.998
4-19	14.657	12.876	11.447	10.284
5-20	14.776	12.993	11.561	10.391
6-21	14.904	13.121	11.685	10.510
7-22	14.950	13.178	11.748	10.576
8-23	14.929	13.178	11.761	10.597
9-24	14.834	13.112	11.715	10.566
10-25	14.683	12.998	11.627	10.497
11-26	14.508	12.861	11.519	10.410
12-27	14.323	12.715	11.402	10.314
13-28	14.132	12.564	11.280	10.215
14-29	13.936	12.408	11.153	10.110
15-30	13.734	12.246	11.021	10.001
16-31	13.527	12.078	10.883	9.886
17-32	13.320	11.911	10.746	9.771
18-33	13.121	11.750	10.613	9.660
19-34	12.930	11.595	10.486	9.554
20-35	12.744	11.445	10.363	9.451
21-36	12.567	11.302	10.246	9.354
22-37	12.394	11.163	10.132	9.260
23-38	12.218	11.020	10.015	9.163
24-39	12.038	10.874	9.895	9.063
25-40	11.854	10.725	9.771	8.960

TABLE XXIII. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
26-41	11.670	10.574	9.647	8.855
27-42	11.486	10.423	9.522	8.751
28-43	11.302	10.272	9.396	8.645
29-44	11.114	10.117	9.267	8.536
30-45	10.923	9.959	9.135	8.424
31-46	10.728	9.797	8.998	8.309
32-47	10.530	9.631	8.858	8.189
33-48	10.327	9.461	8.714	8.066
34-49	10.120	9.286	8.565	7.938
35-50	9.912	9.110	8.415	7.809
36-51	9.707	8.937	8.267	7.681
37-52	9.503	8.763	8.119	7.553
38-53	9.296	8.586	7.966	7.421
39-54	9.085	8.406	7.810	7.286
40-55	8.870	8.221	7.651	7.146
41-56	8.655	8.035	7.489	7.005
42-57	8.439	7.848	7.326	6.862
43-58	8.222	7.660	7.162	6.718
44-59	8.003	7.469	6.994	6.570
45-60	7.781	7.274	6.822	6.418
46-61	7.556	7.076	6.648	6.263
47-62	7.328	6.875	6.469	6.104
48-63	7.093	6.667	6.283	5.937
49-64	6.854	6.454	6.093	5.767
50-65	6.611	6.236	5.897	5.590
51-66	6.369	6.019	5.701	5.412
52-67	6.127	5.801	5.504	5.233
53-68	5.884	5.580	5.303	5.050
54-69	5.638	5.357	5.100	4.864

TABLE XXIII. continued.

Ages.	Value at 3 per Cent	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
55-70	5.391	5.132	4.893	4.674
56-71	5.145	4.905	4.685	4.482
57-72	4.899	4.679	4.477	4.289
58-73	4.656	4.455	4.269	4.096
59-74	4.418	4.234	4.064	3.906
60-75	4.189	4.021	3.866	3.721
61-76	3.974	3.821	3.679	3.546
62-77	3.760	3.621	3.492	3.371
63-78	3.538	3.414	3.297	3.188
64-79	3.303	3.192	3.088	2.990
65-80	3.063	2.965	2.873	2.786
66-81	2.833	2.746	2.664	2.587
67-82	2.610	2.533	2.461	2.393
68-83	2.403	2.336	2.272	2.211
69-84	2.244	2.183	2.126	2.071
70-85	2.097	2.042	1.991	1.941
71-86	1.963	1.914	1.867	1.823
72-87	1.838	1.794	1.753	1.713
73-88	1.736	1.697	1.660	1.625
74-89	1.603	1.570	1.538	1.508
75-90	1.440	1.413	1.387	1.361
76-91	1.221	1.200	1.180	1.160
77-92	0.985	0.970	0.955	0.942
78-93	0.706	0.697	0.688	0.679
79-94	0.458	0.453	0.448	0.443
80-95	0.210	0.208	0.206	0.204
81-96	0.000	0.000	0.000	0.000

TABLE XXIV.

Shewing the Value of an Annuity on the joint Continuance of Two Lives according to the *Northampton* Table of Observations. See Table XVII.

Difference of Age *twenty* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-21	11.413	10.053	8.961	8.070
2-22	13.172	11.605	10.344	9.313
3-23	13.794	12.161	10.843	9.764
4-24	14.178	12.511	11.163	10.057
5-25	14.301	12.633	11.281	10.170
6-26	14.420	12.754	11.400	10.285
7-27	14.451	12.798	11.452	10.341
8-28	14.417	12.786	11.455	10.354
9-29	14.310	12.710	11.401	10.315
10-30	14.150	12.586	11.304	10.239
11-31	13.965	12.441	11.188	10.144
12-32	13.770	12.286	11.062	10.042
13-33	13.570	12.125	10.932	9.934
14-34	13.363	11.959	10.796	9.822
15-35	13.151	11.787	10.655	9.703
16-36	12.932	11.609	10.507	9.579
17-37	12.714	11.430	10.358	9.454
18-38	12.502	11.257	10.214	9.333
19-39	12.297	11.089	10.074	9.215
20-40	12.096	10.924	9.937	9.100
21-41	11.906	10.768	9.809	8.992
22-42	11.723	10.619	9.685	8.889
23-43	11.540	10.470	9.562	8.786
24-44	11.364	10.317	9.435	8.670

TABLE XXIV. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
25-45	11.164	10.160	9.304	8.569
26-46	10.970	10.000	9.170	8.455
27-47	10.773	9.836	9.032	8.338
28-48	10.572	9.667	8.890	8.217
29-49	10.366	9.495	8.744	8.092
30-50	10.160	9.321	8.596	7.966
31-51	9.957	9.151	8.451	7.841
32-52	9.756	8.980	8.306	7.716
33-53	9.550	8.806	8.157	7.588
34-54	9.342	8.629	8.005	7.457
35-55	9.181	8.448	7.849	7.322
36-56	8.916	8.264	7.690	7.183
37-57	8.699	8.076	7.527	7.041
38-58	8.477	7.884	7.360	6.894
39-59	8.253	7.689	7.189	6.744
40-60	8.025	7.490	7.015	6.590
41-61	7.796	7.290	6.838	6.434
42-62	7.567	7.088	6.660	6.276
43-63	7.332	6.881	6.477	6.112
44-64	7.095	6.671	6.289	5.944
45-65	6.850	6.453	6.094	5.769
46-66	6.602	6.230	5.894	5.588
47-67	6.351	6.004	5.690	5.403
48-68	6.096	5.774	5.481	5.218
49-69	5.839	5.541	5.268	5.019
50-70	5.582	5.306	5.054	4.822
51-71	5.328	5.074	4.841	4.626
52-72	5.077	4.845	4.630	4.430

TABLE XXIV. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
53-73	4.829	4.614	4.417	4.234
54-74	4.585	4.389	4.208	4.040
55-75	4.350	4.171	4.006	3.852
56-76	4.129	3.966	3.815	3.674
57-77	3.908	3.761	3.623	3.494
58-78	3.682	3.549	3.424	3.308
59-79	3.440	3.322	3.210	3.105
60-80	3.197	3.092	2.992	2.899
61-81	2.964	2.870	2.782	2.699
62-82	2.739	2.656	2.578	2.504
63-83	2.530	2.457	2.387	2.321
64-84	2.371	2.305	2.242	2.182
65-85	2.223	2.163	2.107	2.053
66-86	2.089	2.035	1.984	1.936
67-87	1.963	1.915	1.870	1.826
68-88	1.860	1.817	1.777	1.737
69-89	1.722	1.685	1.650	1.616
70-90	1.545	1.515	1.486	1.459
71-91	1.303	1.280	1.259	1.238
72-92	1.044	1.028	1.012	0.997
73-93	0.743	0.733	0.723	0.714
74-94	0.480	0.474	0.469	0.464
75-95	0.219	0.217	0.215	0.213
76-96	0.000	0.000	0.000	0.000

TABLE XXV.

Shewing the Value of an Annuity on the *joint* Continuance of Two Lives, according to the *Northampton* Table of Observations. See Table XVII.

Difference of Age *twenty-five* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-26	11.037	9.770	8.742	7.897
2-27	12.722	11.264	10.080	9.104
3-28	13.307	11.790	10.555	9.537
4-29	13.661	12.116	10.855	9.813
5-30	13.762	12.220	10.959	9.913
6-31	13.859	12.322	11.062	10.015
7-32	13.871	12.350	11.100	10.060
8-33	13.820	12.323	11.090	10.061
9-34	13.698	12.234	11.024	10.012
10-35	13.525	12.098	10.916	9.925
11-36	13.328	11.941	10.788	9.820
12-37	13.120	11.773	10.651	9.707
13-38	12.906	11.600	10.509	9 588
14-39	12.686	11.420	10.360	9.464
15-40	12.459	11.234	10.205	9 333
16-41	12.229	11.044	10.046	9.198
17-42	12.002	10.856	9.889	9.065
18-43	11.785	10.677	9.739	8 938
19-44	11.574	10.502	9.592	8.814
20-45	11.367	10.330	9.448	8.692
21-46	11.167	10.165	9.310	8.574
22-47	10.969	10.001	9.173	8.458
23-48	10 768	9.833	9.031	8.338

TABLE XXV. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
24-49	10.562	9.661	8.886	8.214
25-50	10.356	9.488	8.739	8.089
26-51	10.154	9.318	8.595	7.966
27-52	9.952	9.148	8.451	7.842
28-53	9.748	8.975	8.304	7.716
29-54	9.540	8.799	8.153	7.586
30-55	9.329	8.619	7.999	7.453
31-56	9.115	8.436	7.841	7.316
32-57	8.897	8.250	7.680	7.175
33-58	8.677	8.060	7.515	7.031
34-59	8.454	7.866	7.346	6.884
35-60	8.227	7.669	7.174	6.732
36-61	7.997	7.469	6.998	6.577
37-62	7.765	7.265	6.819	6.418
38-63	7.525	7.053	6.631	6.252
39-64	7.281	6.838	6.440	6.081
40-65	7.030	6.614	6.240	5.901
41-66	6.776	6.388	6.037	5.718
42-67	6.522	6.159	5.831	5.532
43-68	6.266	5.929	5.622	5.343
44-69	6.008	5.696	5.411	5.150
45-70	5.749	5.460	5.195	4.953
46-71	5.488	5.222	4.978	4.753
47-72	5.228	4.983	4.758	4.551
48-73	4.970	4.746	4.539	4.348
49-74	4.716	4.511	4.322	4.146
50-75	4.472	4.285	4.112	3.951
51-76	4.245	4.074	3.916	3.768

TABLE XXV. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
52-77	4.019	3.864	3.720	3.586
53-78	3.787	3.648	3.518	3.396
54-79	3.540	3.416	3.299	3.189
55-80	3.291	3.180	3.076	2.978
56-81	3.051	2.953	2.861	2.774
57-82	2.820	2.733	2.651	2.574
58-83	2.608	2.530	2.457	2.388
59-84	2.446	2.376	2.310	2.247
60-85	2.297	2.234	2.174	2.118
61-86	2.162	2.105	2.051	2.000
62-87	2.036	1.985	1.937	1.891
63-88	1.932	1.886	1.843	1.802
64-89	1.790	1.751	1.714	1.678
65-90	1.606	1.575	1.544	1.515
66-91	1.354	1.330	1.307	1.285
67-92	1.083	1.067	1.050	1.035
68-93	0.770	0.760	0.750	0.740
69-94	0.497	0.491	0.485	0.480
70-95	0.227	0.224	0.222	0.220
71-96	0.000	0.000	0.000	0.000

TABLE XXVI.

Shewing the Value of an Annuity on the joint Continuance of Two Lives, according to the *Northampton* Table of Observations.

Difference of Age *thirty* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-31	10.605	9.438	8.483	7.691
2-32	12.203	10.865	9.767	8.855
3-33	12.743	11.355	10.213	9.263
4-34	13.061	11.651	10.488	9.518
5-35	13.136	11.732	10.572	9.602
6-36	13.207	11.812	10.656	9.687
7-37	13.195	11.819	10.676	9.715
8-38	13.122	11.772	10.648	9.701
9-39	12.981	11.665	10.565	9.637
10-40	12.791	11.513	10.442	9.537
11-41	12.580	11.342	10.302	9.420
12-42	12.363	11.165	10.156	9.298
13-43	12.144	10.985	10.007	9.173
14-44	11.918	10.799	9.852	9.042
15-45	11.687	10.607	9.690	8.905
16-46	11.448	10.408	9.522	8.762
17-47	11.210	10.208	9.353	8.617
18-48	10.975	10.011	9.186	8.473
19-49	10.746	9.818	9.021	8.332
20-50	10.523	9.630	8.861	8.195
21-51	10.313	9.454	8.712	8.067
22-52	10.111	9.284	8.568	7.944

TABLE XXVI. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
23-53	9.905	9.111	8.421	7.818
24-54	9.696	8.934	8.270	7.688
25-55	9.484	8.754	8.116	7.555
26-56	9.269	8.570	7.958	7.419
27-57	9.051	8.383	7.797	7.279
28-58	8.830	8.193	7.632	7.135
29-59	8.605	7.999	7.464	6.988
30-60	8.378	7.802	7.292	6.837
31-61	8.147	7.601	7.116	6.682
32-62	7.914	7.397	6.937	6.524
33-63	7.673	7.186	6.750	6.359
34-64	7.429	6.971	6.559	6.189
35-65	7.177	6.747	6.360	6.010
36-66	6.922	6.520	6.156	5.827
37-67	6.663	6.288	5.948	5.639
38-68	6.401	6.052	5.735	5.446
39-69	6.137	5.813	5.518	5.249
40-70	5.871	5.571	5.298	5.047
41-71	5.605	5.329	5.076	4.844
42-72	5.341	5.087	4.854	4.640
43-73	5.081	4.848	4.634	4.436
44-74	4.826	4.613	4.417	4.235
45-75	4.580	4.386	4.206	4.040
46-76	4.348	4.171	4.006	3.853
47-77	4.115	3.954	3.805	3.666
48-78	3.875	3.731	3.596	3.469
49-79	3.619	3.490	3.369	3.256
50-80	3.362	3.247	3.140	3.039

TABLE XXVI. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
51-81	3.117	3.015	2.920	2.829
52-82	2.882	2.792	2.707	2.627
53-83	2.665	2.585	2.510	2.438
54-84	2.501	2.428	2.360	2.295
55-85	2.349	2.284	2.222	2.164
56-86	2.211	2.153	2.097	2.044
57-87	2.082	2.030	1.980	1.932
58-88	1.975	1.928	1.883	1.841
59-89	1.828	1.788	1.750	1.713
60-90	1.641	1.608	1.577	1.547
61-91	1.382	1.358	1.334	1.311
62-92	1.105	1.088	1.071	1.055
63-93	0.785	0.774	0.764	0.754
64-94	0.506	0.500	0.494	0.489
65-95	0.230	0.228	0.226	0.224
66-96	0.000	0.000	0.000	0.000

TABLE XXVII.

Shewing the Value of an Annuity on the *joint* Continuance of Two Lives, according to the *Northampton* Table of Observations.

Difference of Age *thirty-five* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-36	10.104	9.047	8.173	7.442
2-37	11.600	10.392	9.390	8.551
3-38	12.087	10.838	9.800	8.928
4-39	12.362	11.097	10.043	9.157
5-40	12.405	11.150	10.102	9.219
6-41	12.446	11.203	10.163	9.283
7-42	12.412	11.190	10.165	9.296
8-43	12.325	11.130	10.124	9.270
9-44	12.174	11.012	10.031	9.197
10-45	11.976	10.851	9.900	9.088
11-46	11.756	10.697	9.774	8.962
12-47	11.525	10.481	9.592	8.827
13-48	11.288	10.284	9.425	8.686
14-49	11.045	10.080	9.252	8.538
15-50	10.799	9.872	9.076	8.386
16-51	10.554	9.665	8.899	8.234
17-52	10.318	9.461	8.724	8.083
18-53	10.076	9.260	8.552	7.934
19-54	9.845	9.063	8.383	7.788
20-55	9.617	8.869	8.216	7.643
21-56	9.394	8.679	8.053	7.502
22-57	9.174	8.491	7.891	7.362
23-58	8.951	8.299	7.725	7.218
24-59	8.725	8.104	7.556	7.070
25-60	8.495	7.906	7.383	6.919
26-61	8.263	7.704	7.207	6.764
27-62	8.028	7.499	7.027	6.605
28-63	7.785	7.286	6.839	6.439

TABLE XXVII. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
29-64	7.539	7.069	6.648	6.268
30-65	7.286	6.844	6.447	6.089
31-66	7.028	6.615	6.243	5.905
32-67	6.768	6.382	6.033	5.717
33-68	6.504	6.146	5.820	5.524
34-69	6.239	5.906	5.603	5.326
35-70	5.971	5.663	5.382	5.125
36-71	5.703	5.419	5.159	4.920
37-72	5.435	5.174	4.934	4.714
38-73	5.169	4.930	4.710	4.507
39-74	4.908	4.690	4.488	4.301
40-75	4.656	4.457	4.272	4.101
41-76	4.420	4.238	4.069	3.912
42-77	4.184	4.019	3.865	3.722
43-78	3.942	3.794	3.655	3.525
44-79	3.685	3.552	3.428	3.312
45-80	3.426	3.308	3.197	3.093
46-81	3.176	3.072	2.973	2.881
47-82	2.936	2.843	2.756	2.673
48-83	2.714	2.632	2.554	2.481
49-84	2.544	2.470	2.400	2.334
50-85	2.388	2.322	2.258	2.198
51-86	2.248	2.188	2.131	2.077
52-87	2.117	2.063	2.012	1.968
53-88	2.008	1.960	1.914	1.870
54-89	1.858	1.817	1.778	1.740
55-90	1.666	1.633	1.601	1.570
56-91	1.402	1.377	1.353	1.330
57-92	1.120	1.102	1.085	1.069
58-93	0.794	0.784	0.773	0.763
59-94	0.511	0.505	0.499	0.494
60-95	0.233	0.230	0.228	0.226
61-96	0 000	0.000	0.000	0.000

TABLE XXVIII.

Shewing the Value of an Annuity on the joint Continuance of Two Lives according to the *Northampton* Table of Observations.

Difference of Age *forty* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-41	9.523	8.585	7.800	7.135
2-42	10.907	9.839	8.942	8.182
3-43	11.343	10.242	9.315	8.528
4-44	11.578	10.468	9.531	8.733
5-45	11.597	10.500	9.571	8.778
6-46	11.610	10.528	9.609	8.823
7-47	11.550	10.491	9.589	8.815
8-48	11.435	10.404	9.524	8.767
9-49	11.260	10.263	9.409	8.673
10-50	11.044	10.085	9.260	8.548
11-51	10.816	9.894	9.100	8.411
12-52	10.582	9.698	8.934	8.270
13-53	10.344	9.497	8.763	8.123
14-54	10.100	9.290	8.586	7.970
15-55	9.851	9.077	8.403	7.812
16-56	9.595	8.858	8.214	7.648
17-57	9.340	8.639	8.024	7.481
18-58	9.089	8.422	7.835	7.316
19-59	8.841	8.207	7.648	7.153
20-60	8.597	7.995	7.463	6.990
21-61	8.357	7.787	7.281	6.830
22-62	8.119	7.580	7.100	6.670
23-63	7.874	7.365	6.910	6.503
24-64	7.626	7.147	6.717	6.331
25-65	7.370	6.920	6.515	6.151
26-66	7.110	6.689	6.309	5.966
27-67	6.847	6.454	6.098	5.776

TABLE XXVIII. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
28-68	6.581	6.215	5.883	5.581
29-69	6.313	5.973	5.664	5.383
30-70	6.043	5.729	5.442	5.180
31-71	5.772	5.483	5.218	4.974
32-72	5.502	5.236	4.992	4.767
33-73	5.235	4.991	4.766	4.559
34-74	4.973	4.749	4.543	4.353
35-75	4.720	4.516	4.327	4.152
36-76	4.481	4.295	4.123	3.962
37-77	4.242	4.073	3.916	3.770
38-78	3.996	3.844	3.702	3.570
39-79	3.734	3.598	3.471	3.352
40-80	3.469	3.349	3.236	3.130
41-81	3.216	3.109	3.009	2.914
42-82	2.973	2.878	2.789	2.705
43-83	2.750	2.666	2.587	2.511
44-84	2.581	2.505	2.433	2.365
45-85	2.424	2.356	2.291	2.230
46-86	2.282	2.221	2.162	2.107
47-87	2.148	2.093	2.041	1.991
48-88	2.036	1.987	1.941	1.895
49-89	1.882	1.840	1.800	1.761
50-90	1.685	1.651	1.619	1.590
51-91	1.417	1.391	1.367	1.343
52-92	1.130	1.113	1.095	1.079
53-93	0.801	0.790	0.780	0.770
54-94	0.515	0.509	0.503	0.498
55-95	0.234	0.232	0.230	0.228
56-96	0.000	0.000	0.000	0.000

TABLE XXIX.

Shewing the Value of an Annuity on the joint continuance of Two Lives, according to the *Northampton* Table of Observations.

Difference of Age *forty-five* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-46	8.888	8.071	7.379	6.787
2-47	10.147	9.221	8.435	7.760
3-48	10.515	9.566	8.759	8.063
4-49	10.697	9.744	8.932	8.230
5-50	10.679	9.742	8.941	8.248
6-51	10.664	9.745	8.956	8.271
7-52	10.586	9.696	8.919	8.248
8-53	10.458	9.591	8.841	8.188
9-54	10.276	9.442	8.718	8.085
10-55	10.055	9.256	8.560	7.951
11-56	9.814	9.052	8.386	7.801
12-57	9.566	8.839	8.203	7.643
13-58	9.312	8.622	8.015	7.479
14-59	9.053	8.399	7.821	7.310
15-60	8.790	8.170	7.622	7.135
16-61	8.521	7.985	7.416	6.953
17-62	8.252	7.700	7.208	6.770
18-63	7.981	7.462	6.998	6.583
19-64	7.714	7.226	6.789	6.396
20-65	7.444	6.986	6.576	6.205
21-66	7.177	6.749	6.364	6.015
22-67	6.911	6.512	6.151	5.824
23-68	6.643	6.271	5.934	5.628
24-69	6.372	6.027	5.713	5.427
25-70	6.099	5.780	5.489	5.223

TABLE XXIX. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
26-71	5.826	5.532	5.263	5.016
27-72	5.554	5.283	5.035	4.807
28-73	5.284	5.036	4.808	4.597
29-74	5.019	4.792	4.583	4.390
30-75	4.764	4.557	4.365	4.188
31-76	4.523	4.335	4.160	3.997
32-77	4.282	4.111	3.952	3.804
33-78	4.035	3.881	3.737	3.602
34-79	3.771	3.633	3.505	3.384
35-80	3.506	3.383	3.268	3.160
36-81	3.251	3.142	3.040	2.944
37-82	3.005	2.909	2.818	2.733
38-83	2.779	2.694	2.613	2.537
39-84	2.607	2.530	2.457	2.388
40-85	2.448	2.379	2.313	2.251
41-86	2.304	2.241	2.182	2.126
42-87	2.168	2.113	2.060	2.009
43-88	2.055	2.006	1.959	1.914
44-89	1.901	1.859	1.818	1.779
45-90	1.702	1.668	1.635	1.604
46-91	1.431	1.405	1.380	1.356
47-92	1.140	1.122	1.105	1.089
48-93	0.808	0.797	0.786	0.776
49-94	0.519	0.512	0.507	0.501
50-95	0.235	0.233	0.231	0.229
51-96	0.000	0.000	0.000	0.000

TABLE XXX.

Shewing the Value of an Annuity on the *joint* Continuance of Two Lives, according to the *Northampton* Table of Observations.

Difference of Age *fifty* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-51	8.171	7.479	6.885	6.370
2-52	9.300	8.520	7.848	7.264
3-53	9.611	8.815	8.128	7.529
4-54	9.751	8.957	8.269	7.668
5-55	9.707	8.931	8.256	7.665
6-56	9.659	8.902	8.241	7.662
7-57	9.549	8.817	8.176	7.612
8-58	9.395	8.691	8.073	7.527
9-59	9.191	8.519	7.927	7.403
10-60	8.952	8.314	7.750	7.250
11-61	8.696	8.092	7.557	7.081
12-62	8.433	7.863	7.357	6.905
13-63	8.161	7.625	7.147	6.719
14-64	7.884	7.381	6.931	6.527
15-65	7.597	7.127	6.705	6.325
16-66	7.304	6.866	6.472	6.115
17-67	7.012	6.604	6.236	5.903
18-68	6.721	6.343	6.001	5.689
19-69	6.434	6.084	5.766	5.476
20-70	6.149	5.826	5.532	5.262
21-71	5.870	5.572	5.300	5.050
22-72	5.595	5.321	5.070	4.840
23-73	5.323	5.072	4.841	4.628

TABLE XXX. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
24-74	5.056	4.827	4.615	4.419
25-75	4.799	4.589	4.396	4.216
26-76	4.556	4.365	4.188	4.024
27-77	4.313	4.140	3.979	3.829
28-78	4.064	3.908	3.762	3.626
29-79	3.798	3.659	3.528	3.406
30-80	3.530	3.406	3.290	3.181
31-81	3.274	3.164	3.060	2.963
32-82	3.027	2.929	2.838	2.751
33-83	2.800	2.713	2.632	2.555
34-84	2.627	2.549	2.476	2.406
35-85	2.468	2.398	2.331	2.268
36-86	2.323	2.260	2.200	2.143
37-87	2.187	2.130	2.077	2.026
38-88	2.072	2.022	1.974	1.929
39-89	1.915	1.872	1.832	1.792
40-90	1.713	1.679	1.646	1.614
41-91	1.439	1.413	1.388	1.364
42-92	1.146	1.128	1.111	1.094
43-93	0.811	0.800	0.790	0.779
44-94	0.521	0.515	0.509	0.503
45-95	0.236	0.234	0.232	0.230
46-96	0.000	0.000	0.000	0.000

TABLE XXXI.

Shewing the Value of an Annuity on the joint Continuance of Two Lives, according to the *Northampton* Table of Observations.

Difference of Age *fifty-five* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-56	7.412	6.843	6.346	5.911
2-57	8.392	7.756	7.199	6.709
3-58	8.630	7.986	7.421	6.922
4-59	8.712	8.075	7.514	7.017
5-60	8.629	8.011	7.466	6.982
6-61	8.542	7.944	7.415	6.945
7-62	8.400	7.828	7.319	6.865
8-63	8.214	7.669	7.184	6.750
9-64	7.984	7.470	7.010	6.598
10-65	7.718	7.236	6.803	6.414
11-66	7.437	6.987	6.581	6.215
12-67	7.149	6.730	6.351	6.009
13-68	6.857	6.468	6.116	5.796
14-69	6.562	6.202	5.876	5.578
15-70	6.264	5.933	5.631	5.355
16-71	5.964	5.660	5.382	5.127
17-72	5.667	5.389	5.133	4.899
18-73	5.378	5.123	4.889	4.673
19-74	5.098	4.866	4.651	4.453
20-75	4.831	4.619	4.424	4.242
21-76	4.583	4.391	4.212	4.046
22-77	4.339	4.164	4.001	3.850
23-78	4.087	3.930	3.783	3.646

TABLE XXXI. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
24-79	3.820	3.679	3.548	3.424
25-80	3.550	3.425	3.308	3.198
26-81	3.292	3.181	3.077	2.979
27-82	3.043	2.945	2.853	2.765
28-83	2.815	2.728	2.646	2.568
29-84	2.641	2.563	2.489	2.418
30-85	2.481	2.411	2.344	2.280
31-86	2.336	2.272	2.212	2.154
32-87	2.198	2.142	2.088	2.036
33-88	2.083	2.033	1.985	1.939
34-89	1.925	1.882	1.841	1.802
35-90	1.723	1.688	1.654	1.622
36-91	1.446	1.420	1.395	1.371
37-92	1.152	1.134	1.116	1.099
38-93	0.815	0.804	0.793	0.783
39-94	0.523	0.517	0.511	0.505
40-95	0.237	0.235	0.233	0.231
41-96	0.000	0.000	0.000	0.000

TABLE XXXII.

Shewing the Value of an Annuity on the *joint* Continuance of Two Lives, according to the *Northampton* Table of Observations.

Difference of Age *sixty* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-61	6.571	6.123	5.725	5.372
2-62	7.391	6.894	6.452	6.059
3-63	7.545	7.048	6.605	6.209
4-64	7.562	7.076	6.641	6.251
5-65	7.429	6.903	6.546	6.171
6-66	7.290	6.846	6.447	6.087
7-67	7.104	6.684	6.306	5.963
8-68	6.884	6.490	6.134	5.811
9-69	6.628	6.262	5.929	5.626
10-70	6.347	6.008	5.700	5.418
11-71	6.056	5.744	5.460	5.199
12-72	5.763	5.478	5.216	4.976
13-73	5.473	5.212	4.972	4.751
14-74	5.188	4.950	4.731	4.528
15-75	4.911	4.695	4.495	4.310
16-76	4.649	4.452	4.270	4.101
17-77	4.388	4.210	4.045	3.892
18-78	4.123	3.964	3.815	3.677
19-79	3.846	3.704	3.571	3.447
20-80	3.569	3.443	3.325	3.214
21-81	3.307	3.195	3.091	2.992
22-82	3.057	2.958	2.865	2.777

TABLE XXXII. continued.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
23-83	2.828	2.740	2.657	2.579
24-84	2.653	2.574	2.499	2.429
25-85	2.492	2.421	2.354	2.290
26-86	2.346	2.282	2.221	2.163
27-87	2.208	2.151	2.096	2.044
28-88	2.091	2.041	1.992	1.946
29-89	1.933	1.889	1.848	1.808
30-90	1.729	1.694	1.660	1.628
31-91	1.451	1.425	1.400	1.376
32-92	1.155	1.137	1.119	1.102
33-93	0.817	0.806	0.795	0.785
34-94	0.524	0.518	0.512	0.506
35-95	0.238	0.235	0.233	0.231
36-96	0.000	0.000	0.000	0.000

TABLE XXXIII.

Shewing the Value of an Annuity on the joint continuance of Two Lives, according to the *Northampton* Table of Observations. See Table XVII.

Difference of Age *sixty-five* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-66	5.633	5.295	4.996	4.728
2-67	6.206	5.896	5.569	5.276
3-68	6.330	5.905	5.641	5.352
4-69	6.277	5.924	5.611	5.332
5-70	6.102	5.768	5.472	5.209
6-71	5.925	5.610	5.331	5.084
7-72	5.714	5.418	5.157	4.929
8-73	5.480	5.204	4.963	4.752
9-74	5.225	4.969	4.747	4.556
10-75	4.902	4.725	4.522	4.350
11-76	4.707	4.487	4.301	4.148
12-77	4.449	4.308	4.195	3.948
13-78	4.185	4.022	3.871	3.729
14-79	3.904	3.759	3.624	3.497
15-80	3.621	3.492	3.372	3.259
16-81	3.348	3.235	3.128	3.028
17-82	3.087	2.987	2.893	2.804
18-83	2.849	2.760	2.677	2.598
19-84	2.668	2.589	2.513	2.442
20-85	2.503	2.431	2.364	2.299
21-86	2.354	2.290	2.229	2.171
22-87	2.216	2.158	2.104	2.051
23-88	2.099	2.048	1.999	1.953
24-89	1.939	1.895	1.854	1.814
25-90	1.734	1.699	1.665	1.633
26-91	1.455	1.429	1.404	1.379
27-92	1.158	1.140	1.122	1.105
28-93	0.819	0.808	0.797	0.786
29-94	0.525	0.519	0.513	0.507
30-95	0.238	0.236	0.234	0.231
31-96	0.000	0.000	0.000	0.000

TABLE XXXIV.

Shewing the Value of an Annuity on the joint Continuance of Two Lives, according to the *Northampton* Table of Observations. See Table XVII.

Difference of Age *seventy* Years.

Ages.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.	Value at 6 per Cent.
1-71	4.611	4.380	4.169	3.976
2-72	5.061	4.814	4.588	4.380
3-73	5.051	4.811	4.591	4.389
4-74	4.953	4.726	4.516	4.323
5-75	4.768	4.557	4.362	4.181
6-76	4.599	4.403	4.221	4.053
7-77	4.402	4.222	4.055	3.899
8-78	4.180	4.010	3.864	3.722
9-79	3.921	3.775	3.638	3.510
10-80	3.647	3.517	3.395	3.281
11-81	3.380	3.264	3.156	3.054
12-82	3.122	3.020	2.924	2.833
13-83	2.884	2.794	2.709	2.628
14-84	2.703	2.622	2.546	2.472
15-85	2.535	2.462	2.393	2.327
16-86	2.380	2.315	2.253	2.194
17-87	2.235	2.177	2.121	2.069
18-88	2.112	2.061	2.012	1.965
19-89	1.948	1.904	1.862	1.822
20-90	1.739	1.704	1.670	1.638
21-91	1.459	1.432	1.407	1.382
22-92	1.160	1.142	1.124	1.107
23-93	0.820	0.809	0.798	0.788
24-94	0.526	0.520	0.514	0.508
25-95	0.238	0.236	0.234	0.232
26-96	0.000	0.000	0.000	0.000

Directions for using the preceding Tables of the Values of Two joint Lives.

IF the two lives have the same common age, or their difference of age is five years, or any multiple of five years, the value of their joint continuance is expressed in the Tables, and may be found by inspection.

If their difference of age is any number of years between 1 and 5, 5 and 10, 10 and 15, &c. the required value may be easily found by the following rule.

"Find, in the preceding Tables, the value of two joint lives, whose difference of "age is that multiple of 5 which is greater "*than*, but at the same time nearest *to*, the "difference of age between the proposed "lives; and the oldest of which is of the "same age with the oldest of the proposed "lives.——Find also, in the preceding Tables, the value of two joint lives whose "difference of age is five years less than the "multiple of 5 just mentioned; and the "oldest of which is, in like manner, of the "same age with the oldest of the proposed lives; and the 1st, 2d, 3d, or 4th "arithmetical mean between the least and "the greatest of these two values will be "the value sought, according as one of the "proposed lives is one year, 2 years, "3 years, or 4 years younger than the "other."

EXAMPLE.

EXAMPLE.

Let the value be required of two joint lives aged 15 and 18, reckoning interest at 3 *per cent.*

That multiple of 5 which is greater than the difference between these ages, but comes nearest to it, is 5.——The value of two joint lives, whose difference of age is 5 years, and the oldest of which is of the same age with the oldest of the two proposed lives; that is, the value of two joint lives aged 18 and 13, is by Table 21st, 15.086. The value of two joint lives whose difference of age is 5 years less, and one of which is also 18: that is, the value of two joint lives aged 18 and 18, is, by Table 20th, 14.516. ——These, then, being the values of two joint lives aged 18 and 13, and of two joint lives aged 18 and 18, it is obvious that the value of two joint lives, aged 18 and 15, must be the *third* of four arithmetical means between 14.516 and 15.086.

N. B. The 1st, 2d, 3d, or 4th arithmetical mean between the least and greatest of any two values, is the least increased by 1, 2, 3, or 4-fifths of the difference between them.

In the present instance, the difference between the two values is .570; its fifth part is .114; and 14.516 increased by thrice this fifth part, makes 14.858, the required value of two joint lives aged 18 and 15.

EXAMPLE II.

Let the value be required of two joint lives aged 31 and 45, reckoning interest at 3 *per cent.*

That multiple of 5 which is the next greater number to 14 (the difference of age between 45 and 31), is 15. The value of two joint lives, whose difference of age is this number, and the oldest of which is of the same age with the oldest of the proposed lives; that is, the value of two joint lives aged 45 and 30, is, by Table 23d, 10.923.

The value of two joint lives, whose difference of age is 5 years less than 15, and the oldest of which is, in like manner of the same age with the oldest of the proposed lives; that is, the value of two joint lives aged 45 and 35, is, by Table 22d, 10.622.

These then being the values of two joint lives aged 45 and 30, and of two joint lives aged 45 and 35, it follows that the value of two joint lives aged 45 and 31, must be the 4th of 4 arithmetical means between the least and the greatest of these two values. That is; it is 10.622 (the least) increased by four-fifths of .301 (the difference),

ence), or by 240, which makes 10.862 the required value of two joint lives aged 45 and 31.

In the same manner may the values not specified in the Tables be found universally for any of the four rates of interest. And that they are sufficiently correct, will appear from the following comparison.

Values of two joint Lives by the Rule just explained, reckoning interest at 3 per cent. *compared with the correct Values.*

Ages.	Value by Rule.	Correct Value.
18 and 14	14.972	14.978
18 and 15	14.858	14.864
18 and 16	14.744	14.744
18 and 17	14.630	14.626

Ages.	Value by Rule.	Correct Value.
45 and 31	10.862	10.869
45 and 32	10.802	10.811
45 and 33	10.742	10.751
45 and 34	10.682	10.688

Ages.	Value by Rule.	Correct Value.
66 and 27	7.092	7.095
66 and 28	7.076	7.080
66 and 29	7.060	7.063
66 and 30	7.044	7.046

In the higher rates of interest the agreement is greater.

I have been enabled to make this comparison by the Tables in the Office for *Equitable*

Equitable Assurances, where, in order to lay the foundation of accuracy in conducting the business of the office, it has been thought necessary to compute minutely to four places of decimals the values by the *Northampton* Observations, *at* 3 *per cent.* of two joint lives *for every possible difference of age.*

The values of any two joint lives being given, the values of the longest of any two single lives are obtained by the following rule.

"From the sum of the values of the
"single lives subtract the value of their
"joint continuance. The remainder will
"be the value of the longest of the two
"lives."

In the former editions of this work, I gave a table of these values; but it is so easy to compute them by this rule, that it is by no means worth while to swell this volume with any such table.

EXAMPLE Let it be required to find the value of the longest of two lives aged 10 and 15; interest being at 4 *per cent.*

The value of a life aged 10, is, by Table 19th, 17.523. The value of a life aged 15, is 16.791. The sum of these two values is 34.314. The value of the joint continuance of these two lives is (by Table 21st) 13.992, which subtracted from 34.314, leaves 20.322, the value sought.

TABLE XXXV.

Shewing the Values of *three equal* joint Lives, according to the *Northampton* Table of Observations, reckoning Interest at 4 *per cent.*

Common Age.	Value at 4 per Cent.	Common Age.	Value at 4 per Ct.	Common Age.	Value at 4 per Ct.
1	5.309	25	9.796	49	6.482
2	8.251	26	9.685	50	6.317
3	9.632	27	9.572	51	6.161
4	10.661	28	9.457	52	6.011
5	11.170	29	9.340	53	5.859
6	11.707	30	9.221	54	5.705
7	12.058	31	9.099	55	5.550
8	12.266	32	8.975	56	5.393
9	12,298	33	8.848	57	5.235
10	12.200	34	8.718	58	5.076
11	12.043	35	8.585	59	4.916
12	11.865	36	8.448	60	4.755
13	11.678	37	8.309	61	4.593
14	11.481	38	8.165	62	4.432
15	11.274	39	8.017	63	4.263
16	11.056	40	7.865	64	4.093
17	10.845	41	7.714	65	3.914
18	10.656	42	7.567	66	3.733
19	10.490	43	7.423	67	3.550
20	10.342	44	7.276	68	3.366
21	10.222	45	7.126	69	3.181
22	10.118	46	6.972	70	2.995
23	10.012	47	6.813	71	2.810
24	9.905	48	6.650	72	2.627

TABLE XXXV. continued.

Common Age.	Value at 4 per Ct.	Common Age.	Value at 4 per Ct.	Common Age.	Value at 4 per Cent.
73	2.448	81	1.245	89	0.614
74	2.277	82	1.092	90	0.563
75	2.119	83	0.949	91	0.452
76	1.985	84	0.860	92	0.337
77	1.855	85	0.782	93	0.185
78	1.720	86	0.716	94	0.085
79	1.563	87	0.662	95	0.015
80	1.400	88	0.646		

TABLE XXXVI.

Shewing the Values of THREE joint Lives, whose Differences of Age are 10 and 20 Years, according to the *Northampton* Table of Observations, reckoning Interest at 4 *per cent.*

Differences of Age 10 and 20 Years.

Ages.			Value at 4 per Cent.	Ages.			Value at 4 per Cent.
1	11	21	8.627	23	33	43	8.586
2	12	22	9.914	24	34	44	8.451
3	13	23	10.344	25	35	45	8.313
4	14	24	10.598	26	36	46	8.171
5	15	25	10.655	27	37	47	8.027
6	16	26	10.708	28	38	48	7.878
7	17	27	10.700	29	39	49	7.725
8	18	28	10.654	30	40	50	7.571
9	19	29	10.562	31	41	51	7.420
10	20	30	10.438	32	42	52	7.272
11	21	31	10.305	33	43	53	7.123
12	22	32	10.170	34	44	54	6.971
13	23	33	10.031	35	45	55	6.816
14	24	34	9.887	36	46	56	6.658
15	25	35	9.738	37	47	57	6.497
16	26	36	9.584	38	48	58	6.332
17	27	37	9.429	39	49	59	6.164
18	28	38	9.278	40	50	60	5.994
19	29	39	9.131	41	51	61	5.827
20	30	40	8.986	42	52	62	5.662
21	31	41	8.850	43	53	63	5.494
22	32	42	8.718	44	54	64	5.322

TABLE XXXVI. continued.

Ages.			Value at 4 per Cent.	Ages.			Value at 4 per Cent.
45	55	65	5.145	61	71	81	2.224
46	56	66	4.965	62	72	82	2.044
47	57	67	4.782	63	73	83	1.875
48	58	68	4.597	64	74	84	1.743
49	59	69	4.408	65	75	85	1.623
50	60	70	4.219	66	76	86	1.519
51	61	71	4.032	67	77	87	1.425
52	62	72	3.847	68	78	88	1.350
53	63	73	3.660	69	79	89	1,248
54	64	74	3.477	70	80	90	1.122
55	65	75	3.298	71	81	91	0.951
56	66	76	3.128	72	82	92	0.767
57	67	77	2.959	73	83	93	0.548
58	68	78	2.785	74	84	94	0.362
59	69	79	2.598	75	85	95	0.169
60	70	80	2.408				

REMARKS *on the two preceding Tables.*

THESE Tables contain the exact values of *three* joint lives having either the same common age, or whose differences of age are 10 and 20 years, according to the *Northampton* Table of Observations, or Table XVII. interest being at 4 *per cent.*

In order to find the values nearly of three joint lives, having *other* differences of age, the following rules should be observed.

If the age of the youngest of the three lives is between 10 and 50, and the difference of age between the youngest and oldest not more than *eight* years, take the *third* of the sum of the three ages for a common age; and the value in the last Table but one, corresponding to that common age, will be the value sought.

EXAMPLE.

Let the value be required of three joint lives whose ages are 15, 16, and 23.

The sum of the ages is 54, the third part of which is 18, and the value (in Table 35th) corresponding to this age, is 10.656, the value required.

Within the limits I have mentioned this rule is tolerably correct. But these limits are so narrow as to render it of little use;

and, therefore, till some person will undertake to finish what has been begun in the two preceding Tables, it will be necessary to make use of the following *general* and very easy rule given by Mr. *Simpson*, for finding the values of any *three* from the values given of any *two* joint lives.

"Let A be the youngest, and C the oldest "of the three proposed lives. Take the "value of the *two* joint lives B and C, and "find the age of a *single* life D of the same "value. Then find the value of the joint "lives A and D, which will be the "answer."

EXAMPLE. Let the three given ages be 20, 30, and 40; and let the rate of interest be 4 *per cent.* The value of the two oldest joint lives B and C will (by Table XXII) be 10.490, answering in Table XIX to a single life D of 54 years, wanting $\frac{69}{220}$[a] of a year. And the value of the joint lives A and D, which (by the rule in p. 356, and by Tables XXVI and XXVII)[b] is 9.085, will be the value sought.

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[a] The value (in Table XIX) which is *nearest* to but *less* than 10.490, is 10.421; which is the value of a single life aged 54. This value subtracted from 10.490 leaves 69, the *numerator* of this fraction. The *denominator* is the difference between 10.421 and 10.641, the last being the value of a life one year younger.

[b] The value deduced from the Tables (by the rule in p. 356) of two joint lives aged 20 and 54, is 9.038.——The value of two joint lives aged 20 and 55, is (by Table XXVII.) 8.869; and of two joint lives aged 20 and 50, is (by Table XXVI.) 9.630. A fifth part of the difference between these values (that is, .153) multiplied by the fraction $\frac{69}{220}$, gives .047, which added to 9.038 makes 9.085, the value deduced from Tables XXVI and XXVII of two joint lives, one aged 20 and the other wanting $\frac{69}{220}$ of a year of 54.——This shews the proper method of calculation in every case: but the difference will be little, if, for the sake of more expedition, D is always taken for that age, whether greater or less, which answers most nearly to the value of the joint lives B and C, without regarding the fraction.

The following comparison will shew how near this rule comes to correctness.

Values of *three joint* Lives.

Ages.	Correct value at 4 *per cent.* by Table 36th.	Value by Rule.	Ages.	Correct value at 4 *per cent.* by Table 35th.	Value by Rule.
10-20-30	10.438	10.563	10-10-10	12.200	12.244
15-25-35	9.738	9.840	15-15-15	11.274	11.376
20-30-40	8.986	9.085	20-20-20	10.342	10.504
25-35-45	8.313	8.395	25-25-25	9.796	9.937
30-40-50	7.571	7.651	30-30-30	9.221	9.351
35-45-55	6.816	6.886	35-35-35	8.585	8.701
40-50-60	5.994	6.046	40-40-40	7.865	7.984
45-55-65	5.145	5.169	45-45-45	7.126	7.249
50-60-70	4.219	4.238	50-50-50	6.317	6.432
55-65-75	3.298	3.292	55-55-55	5.550	5.636
			60-60-60	4.755	4.816
			65-65-65	3.914	3.942
			70-70-70	2.995	3.000
			75-75-75	2.119	2.110

My principal design in calculating the two preceding Tables has been, to enable me to make this comparison; and it may be inferred from it, that Mr. *Simpson's* rule gives the values of three joint lives *generally* within a *ninth* or *tenth*, and sometimes within less than a 20th of a year's purchase.

It may be also observed, that when the oldest of the three ages does not exceed 75, and the youngest is not less than 10, the error falls always on the side of excess, and, consequently, that if .05 (that is, a 20th of a year's purchase) is deducted from the value by the rule, the true value will be obtained, in *some* cases, almost exactly; and, in *most* cases, much more nearly.

The value of three joint lives being known, the value of the longest of any three lives is to be computed by the following rule.

"From the sum of the values of all "the single lives, subtract the sum of the "values of all the joint lives combined "two and two. Then to the remainder "add the value of the three joint lives; and "this last sum will be the value of the "longest of the three lives."——See Mr. *Simpson's Doctrine of Annuities*, &c. p. 23, —or Mr. *Dodson's Mathematical Repository*, Vol. II. p. 244.

EXAMPLE. The sum of the values of three single lives whose ages are 10, 20, and 30, is, by Table XIX. (reckoning interest at 4 *per cent.*) 48.338. The value of *two* joint lives whose ages are 10 and 20, is 13.355; of *two* joint lives whose ages are 10 and 30, is 12.586; of *two* joint lives whose ages are 20 and 30, is 11.873, by Tables XXII and XXIV. And the sum of these three values is 37.814. This sum subtracted from 48.388, leaves 10.524, which remainder added to 10.485 (the value just found of the three joint lives) gives 20.009 the value of the *longest* of the three lives.

The value of three lives at the same ages by the Tables that follow shewing the values of single and joint lives among mankind at large according to observations in *Sweden*, is 21.870.

In the First Volume, p. 185, I signified my intention to insert, in this collection, the tables of the office just mentioned for *Equitable Assurances*. Some of these tables have been already inserted; namely, Table 17th, and the columns shewing the values at 3 *per cent.* in all the Tables from the 19th to the 34th Table.——The values of single and joint lives have been calculated in the office for this rate of interest, because it is the interest by which it regulates all its demands. The values, in the preceding Tables, for the *other* rates of interest, have been calculated with much labour for this work, in order to set aside all occasion for having recourse to Mr. *De Moivre's* hypothesis. See Vol. I. p. 210, &c.—The remaining Tables of this office are those that follow.

TABLE XXXVII.

Shewing the Value of an Annuity on a single Life, for 1, 2, 3, 5, and 7 Years, reckoning the Probabilities of living at every Age as they are given in Table XVII. and Interest at 3 *per cent.*

Ages.	One Year.	Two Years.	Three Years.	Five years.	Seven Years.
10	.962	1.887	2.778	4.459	6.015
15	.962	1.886	2.774	4.443	5.971
20	.957	1.873	2.748	4.385	5.880
25	.956	1.868	2.740	4.367	5.849
30	.954	1.864	2.733	4.349	5.816
35	.953	1.860	2.724	4.328	5.777
40	.951	1.853	2.710	4.294	5.716
45	.948	1.845	2.694	4.256	5.646
50	.943	1.832	2.669	4.195	5.538
55	.938	1.818	2.641	4.128	5.420
60	.932	1.798	2.604	4.041	5.266
65	.923	1.773	2.554	3.919	5.045

TABLE XXXVIII.

Shewing the Value of an Assurance of £100 on a single Life, for 1, 5, or 7 Years, or the whole Duration of Life; reckoning the Probabilities of living as they are in the NORTHAMPTON Table of Observations, (or Table XVII), and interest at 3 *per cent.*

N. B. With respect to the values in this Table, and also in those that follow to Table XL. it must be remembered, that the values in *annual* payments suppose, that the first payment is made at the time of purchasing; and also that a purchaser is allowed his option either to pay the value of the Assurance in the *annual* payments, or in the *single* payments specified in the Table; and that whichever of these he chuses, he is excused the other.

Age.	1 Year.	5 Years.		7 Years.		Whole durat. of life.	
	Premium.	Single Premium.	Annual Premium	Single Premium.	Annual Premium	Single Premium.	Annual Premium
8	1.336	4.632	1.004	6.052	.973	36.256	1.657
10	.890	4.069	.878	5.566	.890	36.903	1.704
15	.895	4.893	1.058	7.129	1.146	39.832	1.928
20	1.362	6.636	1.447	9.048	1.471	42.801	2.179
25	1.530	7.216	1.578	9.817	1.603	45.201	2.403
30	1.661	7.833	1.718	10.656	1.747	47.801	2.665
35	1.816	8.566	1.884	11.714	1.930	50.666	2.991
40	2.030	9.748	2.155	13.290	2.206	53.841	3.397
45	2.332	11.025	2.451	15.166	2.540	57.208	3.894
50	2.753	13.111	2.943	17.848	3.031	60.866	4.530
55	3.252	15.341	3.478	20.870	3.600	64.612	5.318
60	3.906	18.254	4.196	24.733	4.355	68.610	6.366
65	4.759	22.450	5.260	30.541	5.542	72.899	7.835

From these values of Assurances of £100 the values of Assurances of any other sum may be easily collected.

This Office makes assurances for any number of months, or years, of any sums not exceeding £2000[c] on one life; and its tables contain the values for all the intermediate years omitted in this and the two following Tables.

It may be necessary here to add, for the information of those who may not be conversant with decimal arithmetic, that in every value the number on the left hand of the point expresses so many pounds, and that allowing 2s. for every unit in the *first* figure on the right hand of the point, 2½d. for every unit in the *second* figure, and one farthing for every unit in the *third*, will give very nearly the shillings and pence to be added to the pounds in each value.—Thus; 1.336 in the preceding Table is £1. 6s. 9d.—4.632 is £4. 12s. 8d.—1.004 is £1. 0s. 1d. —6.052 is £6. 1s. ¼d.; and .973 is 19s. 5¼d. See the note in Vol. I. p. 14.

There is one remark more necessary to be here attended to; but which I cannot make without some reluctance. In giving an account of this Society, in Vol. I. p. 187, I have recommended, for reasons there mentioned, that in transacting the business of the Society, an addition of 3 or 4 *per cent.* should be made to all the calculated values.

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[c] The society has extended its assurances to the sum of £5000.

But the Society, having lately thought proper to increase its expences of management, and fearing the effect of too great and sudden a reduction, has carried this addition as high as 15 *per cent.*[d] This, when added to the other advantages which the Society enjoys (and particularly that derived from estimating the improvement of the money it receives at 3 *per cent*) would, without doubt, be a very *exorbitant*, were it intended to be a *permanent* charge. But this is not the case. Even this charge leaves a reduction in the payments of above a *quarter*; and should the Society find that, notwithstanding this reduction, it continues still to prosper, as there is every reason to think it will, farther reductions may be expected: And, perhaps, in time it may find itself capable of reducing the payments for Assurances even BELOW those in the preceding Table. Nothing renders this improbable, but the difficulty of keeping out bad lives, and preventing fraudulent assurances; for a comparison of the *Northampton* Table of decrements with the Tables which will be given presently for CHESTER, the parish of HOLY-CROSS, and for the kingdom of SWEDEN, will shew, that were the Society to take the *premiums* in the preceding Table without any addition, it would still be governing itself by probabilities of living much below those among mankind in general.

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[d] This addition to the premiums of the Society has been discontinued since the 1st of January, 1786.

TABLE XXXIX.

Shewing the Value of an Assurance of £100 on two joint Lives, according to the NORTHAMPTON Table of Observations, reckoning interest at 3 *per cent.*

Ages.		Single Premium.	Annual Premium.
10	10	49.498	2.855
	15	51.177	3.053
	20	52.958	3.279
	25	54.319	3.463
	30	55.873	3.688
	35	57.693	3.972
	40	59.832	4.339
	45	62.206	4.794
	50	64.919	5.390
	55	67.801	6.133
	60	71.012	7.135
	65	74.606	8.557
15	15	52.731	3.249
	20	54.388	3.473
	25	55.641	3.653
	30	57.083	3.874
	35	58.783	4.154
	40	60.799	4.517
	45	63.047	4.969
	50	65.634	5.563
	55	68.395	6.303
	60	71.485	7.302
	65	74.960	8.719
20	20	55.923	3.695
	25	57.065	3.871
	30	58.390	4.087
	35	59.968	4.363
	40	61.856	4.723
	45	63.979	5.173
	50	66.438	5.766
	55	69.077	6.506
	60	72.049	7.508
	65	75.406	8.930
25	25	58.106	4.040
	30	59.322	4.248
	35	60.786	4.515
	40	62.559	4.867
	45	64.571	5.308
	50	66.923	5.898
	55	69.461	6.625
	60	72.343	7.619
	65	75.621	9.035
30	30	60.418	4.446
	35	61.754	4.703
	40	63.392	5.044
	45	65.271	5.474

TABLE XXXIX. continued.

Ages.		Single Premium.	Annual Premium.
30	50	67.495	6.048
	55	69.915	6.769
	60	72.685	7.751
	65	75.866	9.156
35	35	62.944	4.947
	40	64.428	5.275
	45	66.149	5.692
	50	68.217	6.252
	55	70.492	6.958
	60	73.125	7.925
	65	76.181	9.316
40	40	65.736	5.588
	45	67.274	5.988
	50	69.154	6.530
	55	71.250	7.218
	60	73.713	81.68
	65	76.612	9.541

Ages.		Single Premium.	Annual Premium.
45	45	68.611	6.567
	50	70.278	6.887
	55	72.164	7.551
	60	74.424	8.476
	65	77.134	9.825
50	50	71.705	7.381
	55	73.344	8.014
	60	75.357	8.907
	65	77.831	10.226
55	55	74.713	8.606
	60	76.443	9.451
	65	78.637	10.721
60	60	77.846	10.235
	65	79.699	11.434
65	65	81.152	12.541

TABLE XL.

Shewing the Value of £100 depending on the Contingency of one Life surviving another, according to the Northampton Table of Observations, reckoning Interest at 3 *per cent.*

Possessor.	Expectant.	Single Premium.	Annual Premium.	Equivalent Annuity.
10	10	24.749	1.427	5.723
	15	24.195	1.444	6.213
	20	23.498	1.455	6.738
	25	22.581	1.437	7.197
	30	21.468	1.417	7.476
	35	20.317	1.399	8.422
	40	19.070	1.383	9.272
	45	17.696	1.364	10.314
	50	16.214	1.346	11.652
	55	14.631	1.324	13.362
	60	12.925	1.299	15.671
	65	11.098	1.273	18.935
	70	9.153	1.246	23.651
15	10	26.979	1.609	5.505
	15	26.365	1.625	5.954
	20	25.609	1.635	6.435
	25	24.549	1.612	6.849
	30	23.391	1.588	7.340
	35	22.136	1.564	7.944
	40	20.778	1.544	8.698
	45	19.281	1.520	9.617
	50	17.666	1.497	10.791
	55	15.941	1.469	12.271
	60	14.083	1.439	14.264
	65	12.092	1.407	17.086
	70	9.973	1.373	21.219
20	10	29.461	1.824	5.345
	15	28.786	1.838	5.760
	20	27.961	1.848	6.207
	25	26.811	1.819	6.582
	30	25.546	1.788	7.027
	35	24.176	1.759	7.570
	40	22.692	1.733	8.246
	45	21.058	1.703	9.059
	50	19.294	1.674	10.085
	55	17.410	1.640	11.366
	60	15.381	1.608	13.029
	65	13.206	1.564	15.341
	70	10.892	1.523	18.634
25	10	31.789	2.027	5.316
	15	31.093	2.042	5.729
	20	30.254	2.052	6.178
	25	29.053	2.020	6.557
	30	27.683	1.982	6.998
	35	26.198	1.946	7.540
	40	24.590	1.913	8.215
	45	22.819	1.876	9.027
	50	20.907	1.841	10.055
	55	18.866	1.799	11.329
	60	16.667	1.755	13.004
	65	14.310	1.710	15.313
	70	11.803	1.662	18.595
30	10	34.404	2.271	5.282
	15	33.694	2.287	5.689
	20	32.843	2.299	6.136
	25	31.640	2.266	6.526
	30	30.209	2.223	6.974
	35	28.589	2.177	7.510
	40	26.834	2.135	8.183
	45	24.901	2.088	8.995
	50	22.815	2.044	10.025
	55	20.588	1.993	11.307

TABLE XL. continued.

Possessor.	Expectant.	Single Premium.	Annual Premium.	Equivalent Annuity.
30	60	18.[illegible]	1.939	12.997
	65	[illegible]16	1.885	15.330
	70	12.880	1.829	18.642
35	10	37.375	2.573	5.236
	15	36.647	2.590	5.632
	20	35.794	2.601	6.073
	25	34.588	2.569	6.464
	30	33.166	2.526	6.924
	35	31.472	2.474	7.466
	40	29.540	2.419	8.128
	45	27.413	2.359	8.930
	50	25.116	2.302	9.952
	55	22.664	2.237	11.227
	60	20.022	2.170	12.917
	65	17.191	2.102	15.255
	70	14.179	2.034	18.590
40	10	40.763	2.956	5.178
	15	40.023	2.974	5.560
	20	39.164	2.991	5.986
	25	37.969	2.954	6.371
	30	36.560	2.909	6.830
	35	34.888	2.857	7.384
	40	32.868	2.794	8.048
	45	30.501	2.715	8.825
	50	27.946	2.639	9.821
	55	25.218	2.555	11.064
	60	22.278	2.468	12.714
	65	19.128	2.382	15.005
	70	15.776	2.296	18.274
45	10	44.511	3.430	5.124
	15	43.766	3.450	5.491
	20	42.921	3.471	5.903
	25	41.753	3.433	6.278
	30	40.369	3.386	6.730
	35	38.735	3.333	7.287
	40	36.775	3.273	7.974
	45	34.506	3.183	8.762
	50	31.432	3.080	9.727
	55	28.364	2.968	10.940
	60	25.057	2.854	12.552
	65	21.514	2.740	14.797
	70	17.744	2.629	18.012
50	10	48.705	4.044	5.064
	15	47.968	4.066	5.415
	20	47.144	4.091	5.809
	25	46.017	4.052	6.170
	30	44.680	4.004	6.608
	35	43.101	3.950	7.163
	40	41.208	3.891	7.838
	45	38.846	3.807	8.657
	50	35.853	3.691	9.634
	55	32.353	3.535	10.791
	60	28.581	3.378	12.338
	65	24.540	3.224	14.491
	70	20.239	3.075	17.570
55	10	53.170	4.810	5.012
	15	52.454	4.834	5.349
	20	51.668	4.867	5.727
	25	50.596	4.826	6.074
	30	49.329	4.776	6.497
	35	47.829	4.721	7.027
	40	46.034	4.664	7.702
	45	43.800	4.583	8.530
	50	40.993	4.479	9.569
	55	37.357	4.303	10.771
	60	33.002	4.080	12.272
	65	28.336	3.863	14.383
	70	23.370	3.656	17.409
60	10	58.087	5.836	4.960
	15	57.403	5.863	5.282

TABLE XL.

Possessor.	Expectant.	Single Premium.	Annual Premium.	Equivalent Annuity.	Possessor.	Expectant.	Single Premium.	Annual Premium.	Equivalent Annuity.
60	20	56.669	5.905	5.643	65	20	62.203	7.367	5.556
	25	55.675	5.865	5.975		25	61.311	7.325	5.871
	30	54.499	5.811	6.379		30	60.251	7.271	6.253
	35	53.103	5.755	6.887		35	58.990	7.213	6.734
	40	51.437	5.699	7.539		40	57.484	7.159	7.353
	45	49.367	5.622	8.352		45	55.620	7.085	8.130
	50	46.777	5.529	9.402		50	53.293	7.002	9.149
	55	43.439	5.371	10.695		55	50.302	6.858	10.446
	60	38.923	5.117	12.274		60	46.279	6.640	12.156
	65	33.419	4.795	14.315		65	40.576	6.270	14.321
	70	27.563	4.490	17.283		70	33.466	5.787	17.150
65	10	63.510	7.285	4.906					
	15	62.870	7.313	5.213					

EXPLANATION.

THE annual premium in this Table is supposed to be payable during the joint continuance of the lives of the *possessor* and *expectant*; and the first payment is supposed to be made at the time of purchasing the Assurance.

The *equivalent annuity* signifies that annuity to which either the *single* premium specified in the Table, or the *annual* premium, will entitle an *expectant* during his survivorship, should such an annuity be preferred to a gross sum payable on survivorship. —Thus; the payment of either £34.588 (£34. 11*s.* 10*d.*) in hand, or of £2.569 (£2. 11*s.* 5*d.*) annually, during the joint lives of a wife aged 25 and a husband aged 35, the first payment to be made immediately, will, according to this Table, entitle the wife, should she survive the husband, either to £100 payable to her when she becomes a widow, or to an annuity payable during her life, after becoming a widow, of £6.464 (£6. 9*s.* 4*d.*)—If she is 35 (or of the same age with her husband) a single payment of £31.472, or an annual payment of £2.474 will, by the Table, entitle her either to £100 payable on her survivorship, or to an annuity for her life of £7.466 after survivorship.

Any payments greater or less will entitle to gross sums or annuities proportionably greater or less.

It is necessary to repeat here the observation made at the end of Table 38th, p. 372, that these are the exact premiums according to the *Northampton* Table of Observations, reckoning interest at 3 *per cent*. The *Equitable Society* adds to these premiums a charge of 15 *per cent*.[c]; and in this case, there is a reason which makes the addition less improper than in any other; I mean, the increase of value which the longer duration of the lives of *females* gives to all assurances depending on *their* survivorship; and which the Society, for want of proper observations, have not yet had the means of calculating. These means, however, will, I think, be furnished by some of the following Tables.

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[c] See Note, p. 373.

TABLE XLI.

Shewing the Probability of the Duration of Human Life at all Ages among Males and Females, at *Warrington* in *Lancashire*; formed from a Register of Mortality kept there by Dr. *Aikin*, for Nine Years, from 1773 to 1781.——See the general Introduction, p. 248, &c.

According to this Register there were born at *Warrington* from 1773 to 1781,

	Males.	Females.	Total.
	1780	1777	3557
Died in the same time, including 14 males and 5 females who died at ages unknown	1287	1432	2719

Marriages in the same time 778, or 86 annually.

	Males.	Females.
Died between birth and 1 month. . . .	99	65
From 1 to 2 months	37	25
2 to 3	26	19
3 to 6	48	57
6 to 9	62	67
9 to 12	70	80
From birth to 1 year.	342	313
From 1 to 2 years	182	210
2 to 3	87	94
3 to 4	53	51
4 to 5	32	32
5 to 6	22	21
6 to 7	11	9
7 to 8	7	9
8 to 9	3	10
9 to 10	4	7
10 to 14	21	18
From birth to 14 years	764	774

TABLE

TABLE XLII. continued.

	Unknown.	Bachelors.	Husbands.	Widowers.	Total.
Of males turned of 14 died from 14 to 17	0	16	0	0	16
17 to 20	0	21	1	0	22
20 25	1	16	13	0	30
25 30	5	14	15	1	35
30 35	3	5	23	3	34
35 40	5	3	28	2	38
40 45	3	1	25	3	32
45 50	2	0	21	3	26
50 60	12	6	48	10	76
60 70	21	6	39	25	91
70 80	11	5	28	36	80
80 90	4	0	10	11	25
Above 90 —	0	0	0	4	4
Total —	67	93	251	98	509
Died under 14					764
Total					1273

TABLE XLI. continued.

				Unknown.	Maids.	Wives.	Widows.	Total.
Of females turned of 14 died from	14	to	17	0	16	0	0	16
	17	to	20	0	20	1	0	21
	20		25	1	21	10	2	34
	25		30	7	12	22	2	43
	30		35	4	3	29	3	39
	35		40	8	8	28	4	48
	40		45	9	11	27	1	48
	45		50	4	8	20	3	35
	50		60	13	7	52	22	94
	60		70	16	5	38	55	114
	70		80	12	12	22	61	107
	80		90	4	2	7	32	45
Above	90		—	1	0	1	7	9
	Total		—	79	125	257	192	653
				Died under 14				774
				Total				1427

From these *data* the following Table has been formed.

Age.	Males. Living.	Males. Decrements.	Females. Living.	Females. Decrements.
0	1273	162	1427	109
3 months		48		57
6 months		62		67
9 months		70		80
1 year	931	182	1114	210
2 years	749	87	904	94
3	662	53	810	51
4	609	32	759	32
5	577	22	727	21
6	555	11	706	9
7	544	7	697	9
8	537	3	688	10
9	534	4	678	7
10	530	5	671	5
11	525	5	666	5
12	520	5	661	4
13	515	6	657	4
14	509	5	653	5
15	504	5	648	5
16	499	6	643	6
17	493	7	637	7
18	486	8	630	7
19	478	7	623	7
20	471	6	616	7
21	465	6	609	6
22	459	6	603	7
23	453	6	596	7
24	447	6	589	7
25	441	7	582	8
26	434	7	574	8
27	427	7	566	9

TABLE XLI. continued.

Ages.	Males.		Females.	
	Living.	Decrements.	Living.	Decrements.
28	420	7	557	9
29	418	7	548	9
30	406	6	539	8
31	400	7	531	8
32	393	7	523	7
33	386	7	516	8
34	379	7	508	8
35	372	7	500	9
36	365	8	491	9
37	357	8	482	10
38	349	8	472	10
39	341	7	462	10
40	334	7	452	10
41	327	7	442	10
42	320	6	432	10
43	314	6	422	9
44	308	6	413	9
45	302	6	404	8
46	296	5	396	7
47	291	5	389	6
48	286	5	383	7
49	281	5	376	7
50	276	6	369	8
51	270	6	361	8
52	264	7	353	9
53	257	7	344	9
54	250	8	335	10
55	242	8	325	10
56	234	8	315	10
57	226	8	305	10
58	218	9	295	10
59	209	9	285	10
60	200	9	275	11

TABLE XLI. continued.

Age.	Males.		Females.	
	Living.	Decrements.	Living.	Decrements.
61	191	9	264	11
62	182	9	253	11
63	173	9	242	11
64	164	9	231	12
65	155	10	219	12
66	145	9	207	12
67	136	9	195	12
68	127	9	183	11
69	118	9	172	11
70	109	9	161	11
71	100	9	150	11
72	91	9	139	11
73	82	9	128	11
74	73	8	117	11
75	65	8	106	11
76	57	8	95	11
77	49	7	84	10
78	42	7	74	10
79	35	6	64	10
80	29	25	54	45
Above 90	4	4	9	9
Totals....	27010	1273	36681	1427

It appears from this Table, and from the register on which it is grounded, that though the probabilities of living among females are higher than among males, and a smaller number is born, yet more die. The reason must be, that more males emigrate, and that many of them die in the army, the navy, and the militia. To this also it is owing, that more *wives* die at WARRINGTON than husbands.

It is proper to add, that in consequence of this greater emigration, the preceding Table gives the proportion of the expectations of life among *males* to those among females lower than it really is. But at the same time it should be remembered, that it does this only for the ages *before* which, and *during* which, the emigration happens. After these ages, (that is, probably after the age of 40 or 50) the correctness of the table cannot be affected by this cause.

See the remarks in the general introduction to these Tables, p. 248, &c.

TABLE XLII.

Shewing the Probability of the Duration of Human Life, at all Ages, among Males and Females; formed from a Register kept by Dr. *Haygarth*, at CHESTER, for Ten Years, from 1772 to 1781.

According to this Register there were born at CHESTER in ten years from 1772 to 1781.

	Males.	Females.
	2192	2115
There were buried at CHESTER during the same time, including 24 whose ages were unknown..........	1939	2151
Marriages 1500, or 150 annually.		
Died between birth and 1 month	115	80
from 1 to 2 months..	67	51
2 to 3........	38	30
Died from birth to 3 months..	220	161
from 3 to 6 months..	75	64
6 to 9........	76	69
9 to 1 year....	67	74
Died from birth to 1 year....	438	368
from 1 to 2 years....	180	181
2 to 3........	107	127
3 to 4........	67	77
4 to 5........	34	53
5 to 10........	91	75
10 to 15........	28	34
15 to 20........	48	53
Died in all under 20 years of age	993	968

TABLE

TABLE XLII. continued.

		Bachelors.	Husbands.	Widowers.	Total.
Of males turned of 20 died between	20 and 25	50	8	0	58
	25 and 30	30	31	1	62
	30 35	19	29	1	49
	35 40	16	38	5	59
	40 45	12	53	6	71
	45 50	9	61	7	77
	50 55	11	54	14	79
	55 60	10	49	13	72
	60 65	13	63	29	105
	65 70	7	40	17	64
	70 75	10	49	40	99
	75 80	3	29	27	59
	80 81	1	9	8	18
	81 82	2	1	6	9
	82 83	0	4	5	9
	83 84	0	1	2	3
	84 85	1	2	2	5
	85 86	0	4	1	5
	86 87	0	3	5	8
	87 88	0	1	2	3
	88 89	0	2	2	4
	89 90	0	0	2	2
	90 91	0	2	2	4
	91 92	0	0	1	1
	92 93	0	2	0	2
	93 94	0	0	1	1
	94 —	0	1	1	2
	97 —	0	0	1	1
	99 —	0	0	1	1
	106 —	1	0	1	2
Died in all of Males above 20		195	536	203	934
Under 20.					993
Total					1927

TABLE XLI. continued.

			Maids.	Wives.	Widows.	Total.
Of females turned of 20 died between	20 and	25	38	13	2	53
	25 and	30	28	49	3	80
	30	35	21	40	4	65
	35	40	7	58	6	71
	40	45	11	54	9	74
	45	50	14	46	16	76
	50	55	16	34	21	71
	55	60	13	32	24	69
	60	65	26	53	37	116
	65	70	9	28	46	83
	70	75	19	37	86	142
	75	80	18	20	70	108
	80	81	3	3	29	35
	81	82	1	0	12	13
	82	83	1	2	15	18
	83	84	1	0	10	11
	84	85	4	6	15	25
	85	86	2	0	8	10
	86	87	1	0	8	9
	87	88	1	0	6	7
	88	89	0	2	6	8
		90	0	0	6	6
		91	0	0	3	3
		92	1	0	4	5
		94	0	0	2	2
		95	0	0	1	1
		96	0	0	1	1
		97	0	1	0	1
		98	0	1	3	4
		99	0	0	1	1
		101	0	0	1	1
		102	0	0	1	1
		103	0	0	1	1
Died in all of females *above* 20			235	479	456	1171
Under 20						968
Total						2139

Of 22 females above the age of 80 who died at *Chester* in 1772, the register specifies no more than that 4 of them were maids, and 14 of them widows who died between 80 and 90; and that the remaining 4 were widows who died above 90.——Of the 4 who had never been married, one has been supposed to die at each of the ages 81, 83, 84, and 85.——Of the 18 widows, 2 have been supposed to die at each of the ages between 80 and 88; two at 91; one at 92; and one at 93.——It was proper to make some distribution of this kind; but it is of little consequence whether it is right or wrong. In every other instance the numbers dying at every age have been taken just as the register has given them; and the following Table has been formed from them.

TABLE XLII. continued.

Age.	Males.		Females.	
	Living.	Decrements.	Living.	Decrements.
0	1927	220	2139	161
3 months	——	75	——	64
6 months	——	76	——	69
9 months	——	67	——	74
1 year	1489	180	1771	181
2 years	1309	107	1580	127
3	1202	67	1463	77
4	1135	34	1386	53
5	1101	30	1333	30
6	1071	24	1303	10
7	1047	18	1285	11
8	1029	11	1274	9
9	1018	8	1265	7
10	1010	6	1258	6
11	1004	5	1252	6
12	999	5	1246	7
13	994	6	1239	7
14	988	6	1232	8
15	982	7	1224	9
16	975	9	1215	10
17	966	10	1205	11
18	956	11	1194	12
19	945	11	1182	11
20	934	11	1171	10
21	923	11	1161	10
22	912	12	1151	10
23	900	12	1141	11
24	888	12	1130	12
25	876	13	1118	16
26	863	13	1102	16
27	850	13	1086	16
28	837	12	1070	16
29	825	11	1054	16

TABLE XLII. continued.

Age.	Males. Living.	Males. Decrements.	Females. Living.	Females. Decrements.
30	814	10	1038	13
31	804	9	1025	13
32	795	10	1012	13
33	785	10	999	13
34	775	10	986	13
35	765	11	973	14
36	754	11	959	14
37	743	12	945	14
38	731	12	931	14
39	719	13	917	15
40	706	13	902	15
41	693	14	887	15
42	679	14	872	15
43	665	15	857	14
44	650	15	843	15
45	635	15	828	15
46	620	15	813	15
47	605	15	798	15
48	590	16	783	16
49	574	16	767	15
50	558	16	752	15
51	542	16	737	14
52	526	16	723	14
53	510	16	709	14
54	494	15	695	14
55	479	14	681	13
56	465	14	668	13
57	451	14	655	13
58	437	14	642	15
59	423	16	627	15
60	407	19	612	20
61	388	22	592	25
62	366	22	507	25
63	344	22	542	25

TABLE XLII. continued.

Age.	Males.		Females.	
	Living.	Decrements.	Living.	Decrements.
64	322	20	517	21
65	302	16	496	17
66	286	13	479	15
67	273	11	464	15
68	262	11	449	16
69	251	13	433	20
70	238	16	413	25
71	222	22	388	30
72	200	22	358	30
73	178	21	328	30
74	157	18	298	27
75	139	15	271	23
76	124	12	248	22
77	112	11	226	21
78	101	11	205	21
79	90	10	184	21
80	80	10	163	21
81	70	10	142	21
82	60	9	121	21
83	51	8	100	21
84	43	7	79	18
85	36	6	61	12
86	30	5	49	8
87	25	4	41	6
88	21	4	35	4
89	17	3	31	4
90	14	3	27	4
91	11	3	23	4
92	8	3	19	4
93	5	2	15	4
94	3	2	11	4
95	1	1	7	3
96			4	3
97			1	1

In this and the last Table there are several irregularities in the decrease of the probabilities of the duration of life, which would not have taken place, had the observations been made on a larger body of people, or for a longer period of years; but they do not much affect the correctness of the expectations and values of lives deducible from these Tables, except at the extremity of life after the age of 80 or 85. According to the *Chester* register, the whole number of males that died at every age for ten years between 80 and 85, was 44——22 died between 85 and 90, and 14 above 90. This register also makes 102 the number of females that died between 80 and 85, and 34 and 27 the numbers that died between 85 and 90, and *above* 90. The preceding Table, from the age of 80 to 97, is formed just as it would have been formed had the register given only this information without particularizing the numbers dying in every single year of life after 80. It will be easily seen that this was necessary. The deaths at the extreme ages beyond 96 or 97, bear so small a proportion to the rest, that there is no occasion for including them in a Table of Observations; nor is it possible to do it properly.

It should be further considered, that the remark at the end of the Table for *Warrington* is applicable to this Table.

COMPARISON of the Duration of the Lives of *Males* and *Females,* according to the preceding Table.

Ages.	Expectations of Males.	Expectations of Females.
Birth	28.13	33.27
5	43.20	47.44
10	41.92	45.17
15	38.05	41.36
20	34.86	38.10
25	32.00	34.78
30	29.25	32.27
35	25.97	29.26
40	22.92	26.37
45	20.20	23.50
50	17.64	20.62
55	15.14	17.52
60	12.36	14.20
65	10.79	11.94
70	8.05	8.81
75	7.00	7.14
80	5.43	5.20
85	4.25	4.81
90	2.50	3.46

ABSTRACT *of the Rev. Mr.* GORSUCH'S *Observations and Register in the Parish of* HOLY CROSS, *near* SHREWSBURY.

In 1755 the number of inhabitants in this parish was 1049.

In 1760 the families were 235—the inhabitants 1048, of whom two were males, and 13 females above 80.

In 1765 the families were 249—the inhabitants 1096.

	In 1770.	1775.	1780.
Families	240	——	246
Inhabitants	1046	1057	1113
Males under 10	126	——	155
Females under 10	122	——	135
Males from 70 to 80	20	20	11
Females from 70 to 80 ...	24	21	19
Males above 80	6	9	4
Females above 80	11	7	5

The increase in 1765 was occasioned by the removal of four numerous families into four great houses in the parish, which for many years before had been almost uninhabited.

In 1767 several houses were pulled down to open a way to a new stone bridge over the *Severn*, and 38 persons went out of the parish.

In 1774 a fire destroyed 48 houses, mostly thatched; but the sufferers provided themselves with lodgings in the parish, and only 24 left it.—The vacant ground was covered with little tenements fit for poor people, and so commodious as to draw into the parish a greater number of persons than had resided there before.——See a further account of this parish in Essay I. page 35.

BIRTHS for 30 years, from 1750 to 1780	Males ...	565	1098
	Females..	533	
BURIALS	Males ...	458	966
	Females..	508	

The births have exceeded the burials in the proportion of 15 to 13; and this ought to have increased the inhabitants in 30 years to at least 1200; but it appears that it has occasioned little or no increase; and, consequently, that the excess of the births has been but just sufficient to supply the loss produced by emigrations to the navy and army, and settlements in towns.

From 1750 to 1760.		From 1760 to 1780.			
	Males and Females	Males.	Females.	Total.	
Died under 1 month	17	22	25	64	
1 year	27	42	44	113	
2 years	15	23	23	61	
From 2 to 5	28	33	38	99	
5 10	23	16	21	60	
10 15	6	4	4	14	35
15 20	7	6	8	21	
20 25	18	4	7	29	57
25 30	11	10	7	28	
30 35	9	4	8	21	57
35 40	11	16	9	36	
40 45	13	16	11	40	67
45 50	8	9	10	27	
50 55	10	16	17	43	80
55 60	13	12	12	37	
60 65	13	22	20	55	94
65 70	15	11	13	39	
70 75	10	17	29	56	95
75 80	10	15	14	39	
80 85	15	22	20	57	71
85 90	8	1	5	14	
90 95	1	0	9	10	13
96	1	0	1	2	
101	0	0	1	1	
	289	321	356	966	

It is obvious, that these observations do not give sufficient *data* for forming distinct tables of the probabilities of living among males and females: And it is also obvious, that the numbers dying in every period of five years after 10, are much more irregular than they would have been had these observations been made for a greater number of years, or on a larger body of inhabitants. In constructing, therefore, the following Table, the decrements of life have been taken as the register gives them for both sexes in every period of ten years after the age of ten. And in this way the register exhibits with remarkable regularity and consistency the progress of human mortality from birth to old age, representing human life in conformity to other observations, as particularly weak in the first month, (though much less so than in towns) and from that age as growing gradually stronger, till at 10 it acquires its greatest strength, which it afterwards loses, but more slowly till 50, and after 50 more rapidly, till at 70 or 75 it is brought back to all the weakness of the first month.

TABLE XLIII.

Shewing the Probabilities of the Duration of Human Life at all Ages, as deduced from the Rev. Mr. Gorsuch's Observations, during a Period of 30 Years, in the Parish of Holy Cross, near Shrewsbury. See Essay I. p. 35.

Age.	Living.	Decr.	Age	Living.	Decr.	Age	Living.	Decr.
0	966	64	21	529	5	44	395	7
Under 1 month	—	113	22	524	5	45	388	7
			23	519	6	46	381	7
1 year	789	61	24	513	6	47	374	7
2	728	44	25	507	6	48	367	7
3	684	30	26	501	6	49	360	7
4	654	25	27	495	6	50	353	7
5	629	20	28	489	6	51	346	7
6	609	16	29	483	6	52	339	7
7	593	12	30	477	5	53	332	8
8	581	7	31	472	5	54	324	8
9	574	5	32	467	5	55	316	8
10	569	4	33	462	6	56	308	8
11	565	3	34	456	6	57	300	9
12	562	3	35	450	6	58	291	9
13	559	3	36	444	6	59	282	9
14	556	3	37	438	6	60	273	9
15	553	3	38	432	6	61	264	9
16	550	4	39	426	6	62	255	9
17	546	4	40	420	6	63	246	9
18	542	4	41	414	6	64	237	9
19	538	4	42	408	6	65	228	9
20	534	5	43	402	7	66	219	10

TABLE XLIII. continued.

Age	Living.	Decr.	Age	Living.	Decr.	Age	Living.	Decr.
67	209	10	77	111	9	87	28	6
68	199	10	78	102	9	88	22	5
69	189	10	79	93	9	89	17	4
70	179	10	80	84	9	90	13	3
71	169	10	81	75	8	91	10	2
72	159	10	82	67	8	92	8	2
73	149	10	83	59	8	93	6	2
74	139	10	84	51	8	94	4	2
75	129	9	85	43	8	95	2	1
76	120	9	86	35	7	96	1	1

EXPECTATIONS of Life by the preceding Table.

Age.	Expectation.
Birth	33.93
5	46.30
10	46.00
15	42.25
20	38.66
25	35.58
30	32.66
35	29.43
40	26.40
45	23.35
50	20.40
55	17.47
60	14.86
65	12.30
70	10.00
75	7.87
80	5.75

The proportion of the living under ten years of age to the living at ten and upwards, is, by this Table, as 6807 to 26452, or as 10 to 39; but the real proportion appears from the survey to be greater: And it is evident, that the excess of the births above the burials, and the emigrations from the parish after ten, must make it considerably greater; and it should not be forgotten, that these also are circumstances which must render the probabilities and expectations of life, as given by the Table, less than they *really* are.

TABLE XLIV.

Shewing the Probabilities of the Duration of Human Life among Males and Females, deduced from Observations of the Proportions of the Living to the Numbers who have died at all Ages for 21 Years, from 1755 to 1776, in the Kingdom of SWEDEN.

PRELIMINARY OBSERVATIONS.

According to the medium of seven different enumerations in 1757, 1760, 1763, 1766, 1769, 1772, and 1775, there were living in the kingdom of SWEDEN :

Ages.	Males.	Females.
Under 1 year	33882	33640
Between 1 and 3 years	62155	63005
3 5	62696	63551
5 10	121871	122460
10 15	117879	118419
15 20	103093	105845
20 25	91907	102306
25 30	82919	93315
30 35	78615	87129
35 40	70390	77077
40 45	63961	70405
45 50	52083	59580
50 55	44908	52689
55 60	36253	44211
60 65	30772	39416
65 70	21170	29610
70 75	14610	21776
75 80	8224	12515
80 85	4036	6418
85 90	1522	2492
Above 90	486	869
Total......	1,103,432	1,206,728
And females......	1,206,728	
Total of males and females	2,310,160	

Fencible men between 15 and 55	587,876	or a *quarter* nearly of the inhabitants.
Males and females under the age of 25	1,201,909	or a little more than *half* the inhabitants.

Of these numbers there died annually in SWEDEN during twenty one years, from 1755 to 1776,

Ages.	Males.	Females.
Under 1 Yr.	9664 or 1 of 3.5*	8355 or 1 of 4.0*
Between 1 and 3 Yrs.	3592 or 1 of 17.3	3531 or 1 of 17.8
3 and 5	1816 or 1 of 34.5	1774 or 1 of 35.8
5 10	1789 1 of 68.1	1672 1 of 73.2
10 15	898 1 of 131.2	802 1 of 147.6
15 20	741 1 of 139.1	714 1 of 148.2
20 25	874 1 of 105.1	776 1 of 131.8
25 30	879 1 of 94.3	872 1 of 106.9
30 35	955 1 of 82.3	1058 1 of 82.3
35 40	907 1 of 77.6	901 1 of 85.5
40 45	1119 1 of 57.1	1129 1 of 62.3
45 50	1077 1 of 48.3	958 1 of 62.2
50 55	1233 1 of 36.4	1127 1 of 46.7
55 60	1180 1 of 30.7	1163 1 of 38.0
60 65	1383 1 of 22.2	1597 1 of 24.6
65 70	1328 1 of 15.9	1510 1 of 19.6
70 75	1360 1 of 10.7	1935 1 of 11.2
75 80	1023 1 of 8.0	1527 1 of 8.2
80 85	784 1 of 5.1	1230 1 of 5.2
85 90	383 1 of 4.0	609 1 of 4.1
Above 90	195 1 of 2.5	339 1 of 2.6
Of all ages	33180 1 of 33.25	33579 1 of 35.94

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* It should be considered, that this is a *higher* proportion than that of the number that dies under one year of age to the number born in a year. The latter number is equal to the former increased by the number living at one time under one year. See the note, p. 418.

The enumerations and deaths for the first 9 years from 1755 to 1763 included the whole kingdom of *Sweden*, consisting of 26 principalities or provinces.——In 1764 there was a suspension of all the observations. In 1765 they were taken up again; but in this and the following years, the enumeration of one of the provinces was omitted, together with the registration of the deaths in that province.—In the three years from 1767 to 1770 three provinces were omitted, in the enumerations and registers.——In the three years from 1770 to 1773, there was also an omission of three provinces, together with the city of STOCKHOLM. And in the remaining three years (to 1776) four out of the 15 dioceses in *Sweden* were omitted. But these omissions will produce no incorrectness in the tables of the decrements and values of lives formed from the preceding *data*.

I have formed tables from the enumerations and deaths in the first nine years, comprehending all *Sweden*; but there is no other difference between them and the following Tables, except that the latter give the probabilities of the duration of life a little lower than the former; and the reason of this is, that the mortality of the years 1771, 1772, and 1773, exceeded greatly the mortality of the other years.[a]

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[a] It is also owing to this that the proportions of annual deaths to the living at all ages, as here given, are somewhat greater than those in the first Additional Essay.

In the healthiest of the seven ternaries of years into which these observations have been divided (that is, in the three years[b] from 1765 to 1767) only one in $36\frac{1}{2}$ of males, and 1 in $39\frac{2}{3}$ of females, died. The average proportion for the whole period of 21 years is 1 in $33\frac{1}{4}$ of males; and 1 in $35\frac{94}{100}$ of females. But, in the sickly years just mentioned, there died 1 in 27 of males, and 1 in 29 of females.——The number of the living in the following Tables, at the end of one year of age, is the *difference* between the number born in *Sweden* in a year, and the number of deaths under one year of age (exclusive in both cases of still-borns) accommodated to 10,000 as a radix.

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[b] The whole number of males living in these years was 1,182,848; of females 1,290,068. I have said that one of the 26 provinces of SWEDEN was omitted in the observations for these three years. The addition of this province will make the inhabitants of SWEDEN in 1766 above two millions and a half. In 1757 they were 2,323,195. They increased, therefore, at the rate of near 200,000 in *nine* years. But it appears that this increase had not been of long continuance; for had it been so, a table formed from the decrements as given by the registers, and by taking the medium of annual deaths from 1755 to 1763 for the *radix*, would have given the probabilities of living much too small (and much less than those in the following Table) through the whole duration of life; whereas it does this only in the first stages of life. From 45 to 60 it gives them nearly equal; and after 60 it gives them greater, which is a plain proof that about the beginning of this century *Sweden* was decreasing.——To the same purpose it appears from the enumerations, that while the numbers living in the *first* stages of life were increasing fast, the numbers in the *last* stages were decreasing.

The decrements among *males* in the following Table, increase regularly through every period of life from 10 to 75. But among *females* this increase is interrupted for a few years after 35, and again for a few years after 45.——This cannot be an accidental irregularity, the numbers being too great, and the period for which the observations have been made, too long, to admit of such an irregularity.——Probably, therefore, it must be accounted for in the following manner.——From the age of 30 to 35, the number of married, and consequently of child-bearing women, is greater than at any other ages; and this raises the decrements in that division of life. After 35, this number is diminished, and the decrements fall. Between 40 and 45 the critical periods come on, and the decrements are raised again; but after 45 the number of deaths arising from hence becoming less, the decrements become also less, but continue afterwards to increase with increasing years, till they become greatest at 74 or 75.——It is, however, remarkable that notwithstanding the peculiar dangers to which the lives of females are subject from the causes just mentioned, there are no ages at which a *smaller* proportion of them does not die than of males, except the ages in which the number of deliveries is greatest; and that even *then* the probabilities of living among them are nearly equal to those among males.

TABLE

TABLE XLIV. continued.

	Males.			Females.		
	Born 10,282—282 born dead			10,277-217 born dead		
Ages.	Living.	Decr.	Expect.	Living.	Decr.	Expect.
Born alive	10,000	2300	33.20	10,000	2090	35.70
1 year	7,700	500	42.45	7,910	518	44.00
2	7,200	337	43.83	7,392	350	46.05
3	6,863	240	44.96	7,042	250	47.31
4	6,623	150	45.57	6,792	135	48.04
5	6,473	125	45.62	6,657	120	48.00
6	6,348	105	45.50	6,537	105	47.87
7	6,243	90	45.26	6,432	85	47.64
8	6,153	75	44.91	6,347	70	47.28
9	6,078	65	44.46	6,277	60	46.80
10	6,013	55	43.94	6,217	52	46.25
11	5,958	45	43.26	6,165	46	45.55
12	5,913	45	42.58	6,119	40	44.85
13	5,868	40	41.91	6,079	35	44.15
14	5,828	40	41.24	6,044	35	43.46
15	5,788	39	40.56	6,009	35	42.76
16	5,749	39	39.83	5,974	40	42.04
17	5,710	39	39.11	5,934	40	41.31
18	5,671	44	38.39	5,894	42	40.59
19	5,627	44	37.67	5,852	43	39.87
20	5,583	50	36.95	5,809	43	39.15
21	5,533	50	36.28	5,766	43	38.43
22	5,483	50	35.62	5,723	43	37.72
23	5,433	55	34.96	5,680	44	37.01
24	5,378	55	34.30	5,636	45	36.29
25	5,323	55	33.63	5,591	45	35.58
26	5,268	55	32.98	5,546	50	34.90
27	5,213	55	32.32	5,496	52	34.21
28	5,158	55	31.66	5,444	55	33.53
29	5,103	56	31.00	5,389	55	32.85
30	5,049	59	30.34	5,334	60	32.17

TABLE XLIV. continued.

	MALES.			FEMALES.		
Ages.	Living.	Decr.	Expectat.	Living.	Decr.	Expect.
31	4,988	60	29.69	5,274	60	31.54
32	4,928	60	29.04	5,214	65	30.91
33	4,868	60	28.39	5,149	65	30.28
34	4,808	60	27.74	5,084	65	29.66
35	4,748	60	27.09	5,019	60	29.03
36	4,688	60	26.43	4,959	56	28.26
37	4,628	60	25.76	4,903	56	27.50
38	4,568	60	25.09	4,847	56	26.74
39	4,508	60	24.42	4,791	58	25.97
40	4,448	65	23.75	4,733	65	25.21
41	4,383	72	23.15	4,668	75	24.68
42	4,311	80	22.54	4,593	76	24.75
43	4,231	80	21.93	4,517	76	23.62
44	4,151	80	21.32	4,441	75	23.10
45	4,071	80	20.71	4,366	72	22.57
46	3,991	80	20.12	4,294	67	21.91
47	3,911	80	19.52	4,227	65	21.24
48	3,831	80	18.92	4,162	65	20.58
49	3,751	85	18.32	4,097	70	19.92
50	3,666	95	17.72	4,027	75	19.26
51	3,571	95	17.17	3,952	80	18.64
52	3,476	95	16.63	3,872	85	18.01
53	3,381	95	16.08	3,787	85	17.39
54	3,286	95	15.53	3,702	85	16.77
55	3,191	95	14.98	3,617	85	16.15
56	3,096	95	14.43	3,532	85	15.53
57	3,001	100	13.87	3,447	90	14.92
58	2,901	100	13.33	3,357	90	14.31
59	2,801	100	12.79	3,267	100	13.69
60	2,701	105	12.24	3,167	110	13.08
61	2,596	110	11.72	3,057	118	12.56
62	2,486	115	11.21	2,939	120	12.04
63	2,371	115	10.73	2,819	120	11.52
64	2,256	115	10.26	2,699	120	11.01

TABLE XLIV. continued.

	MALES.			FEMALES,		
Ages.	Living.	Decr.	Expect.	Living.	Decr.	Expect.
65	2,141	115	9.78	2,579	120	10.49
66	2,026	115	9.30	2,459	120	9.97
67	1,911	120	8.84	2,339	120	9.46
68	1,791	125	8.40	2,219	120	8.94
69	1,666	125	7.99	2,099	120	8.42
70	1,541	125	7.60	1,979	130	7.91
71	1,416	125	7.22	1,849	140	7.53
72	1,291	120	6.87	1,709	150	7.16
73	1,171	120	6.53	1,559	160	6.78
74	1,051	110	6.22	1,399	150	6.40
75	941	105	5.89	1,249	140	6.03
76	836	100	5.56	1,109	130	5.73
77	736	90	5.25	979	120	5.43
78	646	85	4.92	859	110	5.11
79	561	80	4.59	749	100	4.79
80	481	75	4.27	649	95	4.47
81	406	70	3.96	554	90	4.18
82	336	65	3.69	464	85	3.84
83	271	60	3.45	379	80	3.59
84	211	50	3.30	299	75	3.42
85	161	40	3.10	224	55	3.40
86	121	30	3.04	169	40	3.34
87	91	22	2.88	129	30	3.22
88	69	17	2.64	99	23	3.05
89	52	14	2.34	76	18	2.82
90	38	12	2.02	58	15	2.55
91	26	9		43	12	
92	17	7		31	10	
93	10	6		21	8	
94	4	3		13	6	
95	1	1		7	4	
96	0	0		3	2	
97	0	0		1	1	

TABLE XLV.

Shewing the Probabilities of the Duration of Human Life among Males and Females, taken collectively, deduced from the preceding Table.

Born. . . . 10,249—249 born dead				Age.	Living.	Decr.	Expect.
Age.	Living.	Decr.	Expect.				
Born alive	10000	2195	34.42	35	4884	59	28.03
1 year	7805	509	42.95	36	4825	58	27.31
2 years	7296	344	44.92	37	4767	58	26.68
3	6952	245	46.11	38	4709	58	26.01
4	6707	143	46.78	39	4651	60	25.33
5	6564	122	46.79	40	4591	65	24.66
6	6442	105	46.66	41	4526	73	24.05
7	6337	87	46.43	42	4453	78	23.44
8	6250	73	46.07	43	4375	78	22.83
9	6177	62	45.61	44	4297	78	22.22
10	6115	54	45.07	45	4219	76	21.61
11	6061	45	44.38	46	4143	74	20.98
12	6016	42	43.70	47	4069	72	20.35
13	5974	38	43.01	48	3997	73	19.72
14	5936	37	42.33	49	3924	78	19.09
15	5899	37	41.64	50	3846	85	18.46
16	5862	40	40.92	51	3761	87	17.87
17	5822	40	40.19	52	3674	90	17.29
18	5782	42	39.47	53	3584	90	16.70
19	5740	43	38.74	54	3494	91	16.12
20	5697	47	38.02	55	3403	91	15.53
21	5650	47	37.33	56	3312	92	14.95
22	5603	48	36.64	57	3220	95	14.37
23	5555	48	35.96	58	3125	95	13.79
24	5507	50	35.27	59	3030	100	13.21
25	5457	50	34.58	60	2930	108	12.63
26	5407	52	33.91	61	2822	114	12.12
27	5355	54	33.23	62	2708	118	11.62
28	5301	55	32.56	63	2590	118	11.11
29	5246	55	31.88	64	2472	118	10.61
30	5191	59	31.21	65	2354	118	10.10
31	5132	60	30.57	66	2236	118	9.62
32	5072	62	29.94	67	2118	121	9.15
33	5010	63	29.30	68	1997	124	8.67
34	4947	63	28.67	69	1873	124	8.20
				70	1749	127	7.72

TABLE XLV. continued.

Age.	Living.	Decr.	Expectat.	Age.	Living.	Decr.	Expect.
71	1622	133	7.32	86	144	35	3.09
72	1489	135	6.89	87	109	27	2.92
73	1354	140	6.53	88	82	20	2.71
74	1214	130	6.23	89	62	15	2.43
75	1084	121	5.91	90	47	14	2.05
76	963	115	5.59	91	33	12	1.71
77	848	105	5.28	92	21	10	1.40
78	743	95	4.96	93	11	6	
79	648	90	4.61	94	5	3	
80	558	90	4.28	95	2	1	
81	468	84	4.01	96	1	1	
82	384	75	3.80				
83	309	65	3.57				
84	244	55	3.39				
85	189	45	3.23				

In forming this Table from the decrements of life among males and females in Table XLIV. it is necessary to consider that the proper decrements for a body of males and females taken collectively, are not the means between those for males and females in that Table; but the numbers dying in every period of life out of a given number living at the beginning of that period, supposed to consist of *equal* numbers of males and females.

For example. Table XLIV. shews that of 2701 males living at 60 years of age, 560 will die in five years; and that of 3167 *females* living at the same age, 588 will die in the same time. From hence it may be easily deduced, that of 2930 persons (the number in this Table living at 60) consisting one half of males and one half of females, 576 will die in the same time. The number, therefore, living at 60 will at 65 be reduced to 2354; which number must again be supposed to consist one half of males and the other half of females, and the proper decrement for the next five years, deduced in the same manner from Table XLIV. And it is in this method the whole of this Table has been constructed, which, therefore must exhibit more accurately than any other, the probabilities of living among the general mass of mankind, consisting of males and females taken collectively.

TABLE XLVI.

Shewing the Probabilities of the Duration of Human Life among Males and Females in STOCKHOLM, formed from the Proportions of the Living to the Numbers who have died in STOCKHOLM at all Ages for Nine Years from 1755 to 1763.

	Males.	Females.
There were born alive in STOCKHOLM annually from 1755 to 1763	1335	1207
Still-born	$43\frac{1}{3}$	31

According to the medium of three different enumerations in 1757, 1760, and 1763, there were living in STOCKHOLM,

	Males.	Females.
Under 1 year	666	727
From 1 to 3 years	1239	1376
3 to 5	1185	1281
5 10	2662	2769
10 15	2971	2791
15 20	2780	2662
20 25	3293	4255
25 30	3371	4325
30 35	3533	4156
35 40	2763	3101
40 45	2528	2837
45 50	1668	1911
50 55	1402	1892
55 60	874	1340
60 65	705	1247
65 70	404	806
70 75	285	626
75 80	131	314
80 85	57	148
85 90	15	51
Above 90	8	27
Under 15	8723	8944
Between 15 and 55	21338	25139
Above 55	2479	4559
Of all ages	32540	38642

Of these numbers there died annually at STOCKHOLM during nine years from 1755 to 1763;

Ages.	Males.		Females.	
Under 1 year, exclusive of still-born	565 or	1 of 1.17	505 or	1 of 1.44
Between 1 and 3 yrs	179 or	1 of 6.93	187	1 of 7.37
3 5	89	1 of 13.27	81	1 of 15.8
5 10	77	1 of 34.5	71	1 of 38.8
10 15	38	1 of 78.8	24	1 of 114.7
15 20	37	1 of 59.1	27	1 of 99.8
20 25	74	1 of 44.3	54	1 of 79.3
25 30	101	1 of 33.2	75	1 of 57.9
30 35	119	1 of 29.6	96	1 of 43.3
35 40	104	1 of 26.56	79	1 of 39.1
40 45	110	1 of 23.0	92	1 of 31.0
45 50	86	1 of 19.4	69	1 of 27.7
50 55	85	1 of 16.4	75	1 of 25.3
55 60	62	1 of 14.1	56	1 of 24.0
60 65	69	1 of 10.74	77	1 of 16.06
65 70	43	1 of 9.47	60	1 of 13.35
70 75	37	1 of 7.63	77	1 of 8.09
75 80	29	1 of 4.50	61	1 of 5.15
80 85	16	1 of 3.51	47	1 of 3.42
85 90	7	1 of 2.00	21	1 of 2.37
Above 90	3	1 of 2.66	12	1 of 2.31
Of all ages	1930	1 of 16.86	1846	1 of 20.93

From these *data* the following Table has been formed.

Males.			Females.	
Born.. 10324—324 born dead			born 10235—225 born dead	
Age.	Living.	Decr.	Living.	Decrements.
Born alive	10000	4232	10000	3885
1 year	5768*	800	6115*	900
2 yrs.	4968	541	5215	530
3	4427	380	4685	350
4	4047	235	4335	200
5	3812	150	4135	155
6	3662	110	3980	115
7	3552	90	3865	90
8	3462	85	3775	75
9	3377	75	3700	60
10	3302	55	3640	45
11	3247	40	3595	30
12	3207	35	3565	25
13	3172	35	3540	25
14	3137	37	3515	30
15	3100	40	3485	30
16	3060	45	3455	30
17	3015	50	3425	35
18	2965	55	3390	35
19	2910	60	3355	40
20	2850	60	3315	40
21	2790	60	3275	40

* The annual average of males born alive at *Stockholm* for nine years from 1755 to 1763, was 1335. Of these 565 died annually under one year of age. The number, therefore, that lived to one year of age was 770; and 770 is the same part of 1335 that 5768 is of 10000.

In the same manner the number of females who lived to one year of age has been determined; after which, the totals living between 1 and 3, and between 3 and 5, and between 5 and 10, &c. &c. are always made to be in the same ratio to the number dying at those ages that they were found to be by observation.

In this method also the last Table, shewing the probabilities of life in the kingdom of Sweden at large, has been formed.

TABLE

TABLE XLVI. continued.

	MALES.		FEMALES.	
Age.	Living.	Decrements.	Living.	Decrements.
22	2730	60	3255	40
23	2670	60	3195	40
24	2610	65	3155	43
25	2545	70	3112	45
26	2475	70	3065	47
27	2405	70	3020	50
28	2335	70	2970	55
29	2265	70	3915	60
30	2195	70	2855	60
31	2125	70	2795	60
32	2055	70	2735	63
33	1985	65	2672	65
34	1920	65	2607	65
35	1855	65	2542	62
36	1790	65	2480	60
37	1725	65	2420	60
38	1660	60	2360	60
39	1600	60	2300	65
40	1540	60	2235	66
41	1480	60	2169	66
42	1420	60	2103	67
43	1360	60	2036	67
44	1300	60	1969	67
45	1240	60	1902	65
46	1190	57	1837	65
47	1133	55	1772	65
48	1078	55	1707	63
49	1023	55	1644	60
50	968	53	1584	60
51	915	50	1524	60
52	865	50	1464	55
53	815	50	1409	55
54	765	50	1354	53
55	715	45	1301	50
56	670	45	1251	50
57	625	45	1201	50
58	580	40	1151	50
59	540	40	1101	50
60	500	40	1051	55
61	460	40	996	60
62	420	38	936	60

TABLE XLVI. continued.

Age.	Males. Living.	Males. Decrements.	Females. Living.	Females. Decrements.
63	382	35	876	55
64	347	32	821	53
65	315	30	768	49
66	285	28	719	49
67	257	25	670	49
68	232	22	621	49
69	210	22	572	49
70	198	20	523	49
71	168	20	474	49
72	148	18	425	49
73	130	17	376	49
74	113	17	327	49
75	96	16	278	45
76	80	15	233	40
77	65	15	198	35
78	50	11	158	30
79	39	9	128	25
80	30	7	103	23
81	23	5	80	20
82	18	4	60	17
83	14	4	43	12
84	10	3	31	10
85	7	2	21	7
86	5	2	14	5
87	3	2	9	4
88	1	1	5	2
89	0	0	3	2
90	0	0	1	1
Total	147593	10000	185924	10000

COMPARISON of the Duration of the Lives of *Males* and *Females*, according to the preceding Table.

Ages.	Expectations of Males.	Expectations of Females.
Birth	14.25	18.10
5	31.05	37.12
10	30.00	36.89
15	26.74	33.43
20	23.85	30.01
25	21.40	26.80
30	19.42	23.98
35	17.58	21.62
40	15.61	19.25
45	13.78	17.17
50	11.95	15.12
55	10.30	12.89
60	8.69	10.45
65	7.39	8.39
70	5.81	6.16
75	4.09	4.39

From this comparison, and from Tables XLII. and XLIV. p. 388 and 404, it appears, that the difference between the duration of the lives of *males* and *females* is *least* in the kingdom of SWEDEN at large, *greater* at CHESTER, and *greatest* at STOCKHOLM, which seems to indicate that this is a difference not entirely natural.

TABLE XLVII.

Shewing the Values of Annuities on Single Lives among Males and Females, according to the Probabilities of the Duration of Life in the Kingdom of SWEDEN. See Table XLIV. page 404.

	MALES.		**FEMALES.**		**Lives in general.**	
Ages.	4 per cent	5 per cent	4 per cent	5 per cent	4 per cent	5 per cent
1	16.503	14.051	16.820	14.271	16.661	14.161
2	17.355	14.778	17.719	15.034	17.537	14.906
3	17.935	15.279	18.344	15.571	18.139	15.425
4	18.328	15.624	18.780	15.951	18.554	15.787
5	18.503	15.786	18.927	16.088	18.715	15.937
6	18.622	15.901	19.045	16.203	18.833	16.052
7	18.693	15.977	19.131	16.291	18.912	16.134
8	18.725	16.021	19.162	16.335	18.943	16.178
9	18.715	16.030	19.151	16.343	18.933	16.186
10	18.674	16.014	19.109	16.325	18.891	16.169
11	18.600	15.970	19.041	16.286	18.820	16.128
12	18.491	15.896	18.952	16.229	18.721	16.062
13	18.378	15.819	18.840	16.153	18.609	15.986
14	18.246	15.724	18.707	16.059	18.476	15.891
15	18.105	15.624	18.568	15.960	18.336	15.792
16	17.958	15.517	18.424	15.856	18.191	15.686
17	17.803	15.404	18.290	15.761	18.046	15.582
18	17.643	15.285	18.151	15.662	17.897	15.473
19	17.492	15.175	18.013	15.563	17.752	15.369
20	17.335	15.059	17.872	15.462	17.603	15.260
21	17.192	14.955	17.725	15.356	17.458	15.155
22	17.042	14.846	17.573	15.245	17.307	15.045
23	16.887	14.732	17.414	15.129	17.150	14.930
24	16.742	14.627	17.252	15.009	16.997	14.818
25	16.592	14.517	17.087	14.886	16.839	14.701
26	16.436	14.402	16.915	14.757	16.675	14.579
27	16.274	14.282	16.751	14.636	16.512	14.459
28	16.105	14.156	16.588	14.515	16.346	14.335
29	15.930	14.024	16.427	14.396	16.178	14.210
30	15.751	13.889	16.261	14.272	16.006	14.080
31	15.575	13.756	16.104	14.156	15.839	13.956
32	15.395	13.619	15.941	14.035	15.668	13.827
33	15.208	13.477	15.787	13.923	15.497	13.706
34	15.014	13.327	15.629	13.806	15.321	13.566
35	14.812	13.170	15.465	13.684	15.138	13.427

TABLE XLVII. continued.

	Males.		Females.		Lives in general.	
Ages.	4 per cent	5 per cent	4 per cent	5 per cent	4 per cent	5 per cent
36	14.601	13.006	15.278	13.542	14.939	13.274
37	14.382	12.833	15.070	13.382	14.726	13.107
38	14.154	12.652	14.854	13.213	14.504	12.932
39	13.916	12.462	14.629	13.036	14.272	12.749
40	13.668	12.261	14.401	12.856	14.034	12.558
41	13.426	12.065	14.185	12.687	13.805	12.376
42	13.196	11.880	13.994	12.538	13.595	12.209
43	12.984	11.710	13.798	12.387	13.391	12.048
44	12.763	11.532	13.596	12.229	13.179	11.880
45	12.535	11.347	13.383	12.061	12.959	11.704
46	12.297	11.153	13.151	11.876	12.724	11.514
47	12.051	10.951	12.894	11.668	12.472	11.309
48	11.795	10.738	12.620	11.443	12.217	11.090
49	11.528	10.516	12.333	11.205	11.930	10.860
50	11.267	10.298	12.049	10.970	11.658	10.634
51	11.030	10.100	11.769	10.737	11.399	10.418
52	10.785	9.895	11.492	10.507	11.138	10.201
53	10.531	9.682	11.220	10.280	10.875	9.981
54	10.269	9.460	10.937	10.042	10.603	9.751
55	9.998	9.229	10.642	9.792	10.320	9.510
56	9.717	8.988	10.334	9.529	10.025	9.258
57	9.425	8.736	10.012	9.253	9.718	8.994
58	9.140	8.489	9.692	8.976	9.416	8.732
59	8.845	8.232	9.358	8.684	9.101	8.458
60	8.540	7.963	9.039	8.406	8.789	8.184
61	8.241	7.700	8.739	8.144	8.490	7.922
62	7.950	7.442	8.453	7.895	8.201	7.668
63	7.669	7.193	8.166	7.643	7.917	7.418
64	7.382	6.938	7.870	7.382	7.626	7.160
65	7.090	6.676	7.566	7.111	7.328	6.893
66	6.792	6.408	7.252	6.831	7.022	6.619
67	6.489	6.134	6.930	6.541	6.709	6.337
68	6.201	5.872	6.596	6.239	6.398	6.055
69	5.933	5.628	6.253	5.926	6.093	5.777
70	5.670	5.389	5.897	5.599	5.783	5.494
71	5.418	5.158	5.564	5.293	5.491	5.225
72	5.180	4.940	5.261	5.013	5.220	4.976
73	4.940	4.719	4.998	4.770	4.969	4.744
74	4.724	4.521	4.792	4.581	4.758	4.551
75	4.487	4.302	4.582	4.388	4.534	4.345
76	4.253	4.084	4.367	4.189	4.310	4.136
77	4.024	3.871	4.145	3.983	4.084	3.927

TABLE XLVII. continued.

	Males.		Females.		Lives in general.	
Ages.	4 per cent	5 per cent	4 per cent	5 per cent	4 yer cent	5 per cent
78	3.768	3.631	3.913	3.767	3.840	3.699
79	3.512	3.390	3.668	3.536	3.590	3.463
80	3.260	3.152	3.402	3.285	3.331	3.218
81	3.017	2.921	3.145	3.041	3.081	2.981
82	2.792	2.706	2.905	2.812	2.848	2.759
83	2.600	2.523	2.699	2.615	2.649	2.569
84	2.473	2.403	2.559	2.480	2.516	2.441
85	2.371	2.306	2.562	2.476	2.461	2.391
86	2.281	2.222	2.518	2.446	2.399	2.334
87	2.154	2.103	2.431	2.3[illegible]	2.292	2.238
88	1.955	1.912	2.294	2.236	2.124	2.074
89	1.698	1.664	2.108	2.059	1.903	1.861
90	1.417	1.392	1.873	1.833	1.645	1.612
91	1.154	1.136	1.628	1.596	1.391	1.366
92	0.835	0.824	1.349	1.325	1.092	1.074
93	0.477	0.471	1.071	1.054	0.774	0.762
94	0.240	0.238	0.799	0.788	0.519	0.513
95	0 000	0.000	0.544	0.537		
96	0.000	0,000	0.320	0.317		

TABLE XLVIII.

Shewing the Values of Annuities on two joint Lives, according to the Probabilities (in Table XLV.) of the Duration of Human Life among Males and Females collectively, reckoning Interest at 4 *per cent.*

INTEREST 4 *per cent.*

Differences of Age, 0, 6, 12, and 18 Years.

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
1- 1	12.252	1- 7	13.989	1-13	13.894	1-19	13.389
2- 2	13.583	2- 8	14.780	2-14	14.557	2-20	14.008
3- 3	14.558	3- 9	15.323	3-15	14.986	3-21	14.417
4- 4	15.267	4-10	15.685	4-16	15.259	4-22	14.671
5- 5	15.577	5-11	15.817	5-17	15.326	5-23	14.725
6- 6	15.820	6-12	15.887	6-18	15.354	6-24	14.740
7- 7	16.003	7-13	15.914	7-19	15.351	7-25	14.727
8- 8	16.109	8-14	15.888	8-20	15.310	8-26	14.678
9- 9	16.152	9-15	15.824	9-21	15.244	9-27	14.590
10-10	16.141	10-16	15.729	10-22	15.149	10-28	14.484
11-11	16.087	11-17	15.617	11-23	15.033	11-29	14.357
12-12	15.982	12-18	15.477	12-24	14.889	12-30	14.202
13-13	15.855	13-19	15.327	13-25	14.736	13-31	14.045
14-14	15.701	14-20	15.164	14-26	14.566	14-32	13.874
15-15	15.535	15-21	15.001	15-27	14.392	15-33	13.700
16-16	15.361	16-22	14.832	16-28	14.216	16-34	13.520
17-17	15.196	17-23	14.665	17-29	14.042	17-35	13.340
18-18	15.023	18-24	14.491	18-30	13.860	18-36	13.141
19-19	14.854	19-25	14.320	19-31	13.687	19-37	12.934
20-20	14.682	20-26	14.144	20-32	13.512	20-38	12.720
21-21	14.525	21-27	13.976	21-33	13.345	21-39	12.505
22-22	14.360	22-28	13.807	22-34	13.173	22-40	12.286
23-23	14.194	23-29	13.635	23-35	12.997	23-41	12.073
24-24	14.020	24-30	13.455	24-36	12.801	24-42	11.873
25-25	13.849	25-31	13.284	25-37	12.599	25-43	11.683
26-26	13.671	26-32	13.108	26-38	12.387	26-44	11.485
27-27	13.495	27-33	12.935	27-39	12.170	27-45	11.284
28-28	13.323	28-34	12.763	28-40	11.953	28-46	11.072
29-29	13.148	29-35	12.586	29-41	11.742	29-47	10.847
30-30	12.965	30-36	12.390	30-42	11.543	30-48	10.606
31-31	12.795	31-37	12.192	31-43	11.359	31-49	10.365
32-32	12.624	32-38	11.988	32-44	11.170	32-50	10.128

TABLE XLVIII. continued.

INTEREST 4 *per cent.*

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
33-33	12.456	33-39	11.779	33-45	10.978	33-51	9.905
34-34	12.286	34-40	11.568	34-46	10.775	34-52	9.679
35-35	12.109	35-41	11.361	35-47	10.557	35-53	9.452
36-36	11.904	36-42	11.156	36-48	10.314	36-54	9.207
37-37	11.683	37-43	10.953	37-49	10.059	37-55	8.951
38-38	11.452	38-44	10.741	38-50	9.805	38-56	8.683
39-39	11.209	39-45	10.519	39-51	9.558	39-57	8.404
40-40	10.964	40-46	10.286	40-52	9.308	40-58	8.124
41-41	10.732	41-47	10.049	41-53	9.066	41-59	7.839
42-42	10.531	42-48	9.813	42-54	8.830	42-60	7.569
43-43	10.346	43-49	9.581	43-55	8.597	43-61	7.318
44-44	10.154	44-50	9.351	44-56	8.354	44-62	7.075
45-45	9.954	45-51	9.129	45-57	8.101	45-63	6.836
46-46	9.736	46-52	8.897	46-58	7.841	46-64	6.586
47-47	9.497	47-53	8.658	47-59	7.563	47-65	6.323
48-48	9.236	48-54	8.402	48-60	7.281	48-66	6.048
49-49	8.966	49-55	8.139	49-61	7.008	49-67	5.764
50-50	8.707	50-56	7.874	50-62	6.749	50-68	5.487
51-51	8.469	51-57	7.613	51-63	6.505	51-69	5.221
52-52	8.230	52-58	7.351	52-64	6.256	52-70	4.953
53-53	7.994	53-59	7.083	53-65	6.004	53-71	4.694
54-54	7.748	54-60	6.814	54-66	5.743	54-72	4.455
55-55	7.495	55-61	6.555	55-67	5.474	55-73	4.231
56-56	7.229	56-62	6.299	56-68	5.204	56-74	4.043
57-57	6.954	57-63	6.045	57-69	4.936	57-75	3.844
58-58	6.678	58-64	5.788	58-70	4.664	58-76	3.637
59-59	6.388	59-65	5.519	59-71	4.395	59-77	3.430
60-60	6.104	60-66	5.249	60-72	4.149	60-78	3.210
61-61	5.844	61-67	4.984	61-73	3.927	61-79	2.974
62-62	5.600	62-68	4.729	62-74	3.747	62-80	2.744
63-63	5.367	63-69	4.482	63-75	3.562	63-81	2.557
64-64	5.128	64-70	4.231	64-76	3.370	64-82	2.396
65-65	4.881	65-71	3.982	65-77	3.180	65-83	2.252
66-66	4.626	66-72	3.750	66-78	2.974	66-84	2.123
67-67	4.362	67-73	3.527	67-79	2.743	67-85	2.010
68-68	4.130	68-74	3.340	68-80	2.514	68-86	1.910
69-69	3.851	69-75	3.147	69-81	2.324	69-87	1.798
70-70	3.593	70-76	2.946	70-82	2.155	70-88	1.661
71-71	3.345	71-77	2.752	71-83	2.004	71-89	1.464
72-72	3.128	72-78	2.558	72-84	1.875	72-90	1.189
73-73	2.935	73-79	2.355	73-85	1.768	73-91	0.937

TABLE XLVIII. continued.

Interest 4 *per cent.*

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
74-74	2.797	74-80	2.172	74-86	1.692	74-92	0.708
75-75	2.648	75-81	2.017	75-87	1.605	75-93	0.575
76-76	2.490	76-82	1.877	76-88	1.497	76-94	0.481
77-77	2.340	77-83	1.756	77-89	1.339	77-95	0.421
78-78	2.170	78-84	1.639	78-90	1.097		
79-79	1.967	79-85	1.524	79-91	0.863		
80-80	1.758	80-86	1.416	80-92	0.638		
81-81	1.600	81-87	1.320	81-93	0.511		
82-82	1.472	82-88	1.225	82-94	0.427		
83-83	1.364	83-89	1.094	83-95	0.379		
84-84	1.276	84-90	0.902				
85-85	1.212	85-91	0.725				
86-86	1.172	86-92	0.556				
87-87	1.127	87-93	0.459				
88-88	1.071	88-94	0.396				
89-89	0.949	89-95	0.364				
90-90	0.718						
91-91	0.516						
92-92	0.326						
93-93	0.236						
94-94	0.190						
95-95	0.024						

TABLE XLIX.

Shewing the Values of Two joint Lives, according to the Probabilities (in Table XLV.) of the Duration of Human Life among Males and Females collectively.

INTEREST 4 *per cent.*

Differences of Age 24, 30, 36, and 42 Years.

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
1-25	12.832	1-31	12.196	1-37	11.465	1-43	10.546
2-26	13.409	2-32	12.780	2-38	11.913	2-44	10.946
3-27	13.778	3-33	13.066	3-39	12.164	3-45	11.168
4-28	14.003	4-34	13.264	4-40	12.284	4-46	11.260
5-29	14.037	5-35	13.277	5-41	12.242	5-47	11.183
6-30	14.033	6-36	13.242	6-42	12.185	6-48	11.064
7-31	14.006	7-37	13.170	7-43	12.112	7-49	10.915
8-32	13.944	8-38	13.059	8-44	12.004	8-50	10.743
9-33	13.855	9-39	12.913	9-45	11.865	9-51	10.560
10-34	13.741	10-40	12.743	10-46	11.694	10-52	10.357
11-35	13.604	11-41	12.563	11-47	11.493	11-53	10.140
12-36	13.428	12-42	12.379	12-48	11.259	12-54	9.898
13-37	13.234	13-43	12.196	13-49	11.011	13-55	9.644
14-38	13.023	14-44	11.997	14-50	10.759	14-56	9.371
15-39	12.798	15-45	11.787	15-51	10.514	15-57	9.087
16-40	12.570	16-46	11.562	16-52	10.264	16-58	8.799
17-41	12.351	17-47	11.328	17-53	10.018	17-59	8.503
18-42	12.146	18-48	11.076	18-54	9.761	18-60	8.208
19-43	11.951	19-49	10.819	19-55	9.500	19-61	7.928
20-44	11.751	20-50	10.567	20-56	9.228	20-62	7.658
21-45	11.550	21-51	10.332	21-57	8.953	21-63	7.396
22-46	11.335	22-52	10.092	22-58	8.675	22-64	7.127
23-47	11.107	23-53	9.852	23-59	8.385	23-65	6.851
24-48	10.862	24-54	9.602	24-60	8.097	24-66	6.566
25-49	10.612	25-55	9.347	25-61	7.823	25-67	6.275
26-50	10.364	26-56	9.080	26-62	7.557	26-68	5.986
27-51	10.130	27-57	8.807	27-63	7.297	27-79	5.702
28-52	9.894	28-58	8.534	28-64	7.032	28-70	5.415
29-53	9.659	29-59	8.250	29-65	6.761	29-71	5.136
30-54	9.413	30-60	7.967	30-66	6.481	30-72	4.881
31-55	9.167	31-61	7.702	31-67	6.197	31-73	4.646
32-56	8.912	32-62	7.446	32-68	5.917	32-74	4.453
33-57	8.651	33-63	7.196	33-69	5.642	33-75	4.251
34-58	8.389	34-64	6.942	34-70	5.364	34-76	4.040
35-59	8.114	35-65	6.679	35-71	5.093	35-77	3.833
36-60	7.833	36-66	6.402	36-72	4.840	36-78	3.605

TABLE XLIX. continued.

Interest 4 *per cent.*

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
37-61	7.561	37-67	6.115	37-73	4.603	37-79	3.352
38-62	7.296	38-68	5.828	38-74	4.405	38-80	3.098
39-63	7.033	39-69	5.543	39-75	4.195	39-81	2.889
40-64	6.763	40-70	5.254	40-76	3.975	40-82	2.710
41-65	6.492	41-71	4.977	41-77	3.762	41-83	2.553
42-66	6.225	42-72	4.730	42-78	3.539	42-84	2.418
43-67	5.957	43-73	4.507	43-79	3.295	43-85	2.305
44-68	5.689	44-74	4.322	44-80	3.052	44-86	2.203
45-69	5.426	45-75	4.128	45-81	2.854	45-87	2.083
46-70	5.153	46-76	3.921	46-82	2.684	46-88	1.933
47-71	4.884	47-77	3.715	47-83	2.533	47-89	1.708
48-72	4.633	48-78	3.489	48-84	2.396	48-90	1.385
49-73	4.398	49-79	3.238	49-85	2.277	49-91	1.090
50-74	4.205	50-80	2.990	50-86	2.171	50-92	0.818
51-75	4.008	51-81	2.792	51-87	2.050	51-93	0.662
52-76	3.803	52-82	2.623	52-88	1.901	52-94	0.551
53-77	3.605	53-83	2.475	53-89	1.681	53-95	0.468
54-78	3.389	54-84	2.344	54-90	1.366		
55-79	3.150	55-85	2.232	55-91	1.078		
56-80	2.909	56-86	2.130	56-92	0.810		
57-81	2.710	57-87	2.010	57-93	0.655		
58-82	2.539	58-88	1.864	58-94	0.546		
59-83	2.385	59-89	1.644	59-95	0.464		
60-84	2.248	60-90	1.333				
61-85	2.135	61-91	1.050				
62-86	2.037	62-92	0.789				
63-87	1.926	63-93	0.639				
64-88	1.790	64-94	0.533				
65-89	1.585	65-95	0.456				
66-90	1.290						
67-91	1.017						
68-92	0.764						
69-93	0.617						
70-94	0.514						
71-95	0.441						

REMARKS.

THE directions given at the end of Table XXXIV. for using the tables of the values of joint lives deduced from the *Northampton* Observations, are applicable to the last two Tables, and may be easily adapted to them, by taking the differences of age in those directions at *six* years and its multiples, instead of *five* years and its multiples.

The values of *joint* lives in these Tables have been computed for only one rate of interest; and of *single* lives in Table XLVII. for only two rates of interest. The rules which have been given in the first volume, p. 221, shew, that it would be a needless labour to compute such values, in strict conformity to the observations, for any other rates of interest.

THE last three Tables, I reckon the most important in this collection, not only because the only ones that give the separate values of the lives of males and females, and because derived from observations in their nature more correct, but on account of their particular use in furnishing instruction to the numerous institutions for granting annuities to widows. Mr. *Wargentin* informs me, that even in *Sweden* several societies of this kind have become bankrupts for want of such instruction. I think it, therefore, necessary to add the following Table.

TABLE L.

Shewing the Value of an Annuity for the Life of a Wife after the Death of her Husband; deduced from the SWEDEN Observations on the separate Probabilities of the duration of Life among Males and Females.

The Annuity 10l.——Interest 4 *per cent.*

Wife's Age.	Husband's Age.	Value of the Ann.		Wife's Age.	Husband's Age.	Value of the Annuity	
		Single Payment	Annual Payment			Single Payment.	Annual Payment.
		£	£			£	£
16	16	30.63	1.87	20	20	31.90	2.03
	22	35.92	2.26		26	37.28	2.46
	28	42.08	2.76		32	43.60	3.00
	34	49.04	3.38		38	51.52	3.80
	40	58.54	4.31		44	61.21	4.80
	46	68.62	5.46		50	73.05	6.31
	52	81.60	7.24		56	86.44	8.36
	58	96.25	9.82		62	102.14	11.79

TABLE L. continued.

Wife's Age.	Husband's Age.	Value of the Annuity. Single Payment.	Value of the Annuity. Annual Payment.
		£	£.
24	24	32.32	2.15
	30	37.97	2.62
	36	44.51	3.22
	42	53.79	4.18
	48	63.90	5.38
	54	76.50	7.21
	60	91.55	10.06
28	28	32.64	2.28
	34	38.25	2.77
	40	46.35	3.58
	46	55.16	4.57
	52	66.94	6.14
	58	80.54	8.45
	64	95.56	11.90
32	32	33.16	2.43
	38	39.52	3.04
	44	47.71	3.92
	50	58.13	5.22
	56	70.29	7.09
	62	84.95	10.05
	68	100.24	14.49
36	36	33.74	2.61
	42	41.81	2.86
	48	49.64	4.38
	54	61.71	6.04
	60	74.44	8.43
	66	88.76	12.00
		£.	£.
42	42	34.62	3.00
	48	41.81	3.86
	54	51.63	5.25
	60	64.25	7.49
	66	77.69	10.75
	72	92.63	16.16
46	46	34.15	3.18
	52	42.54	4.29
	58	53.10	6.00
	64	65 65	8.65
	70	79.97	12.99
50	50	33.42	3.44
	56	41.75	4.70
	62	53.00	6.83
	68	65.62	10.11
54	54	31.89	3.63
	60	41.23	5.27
	66	51.94	7.70
	72	64.82	11.88
58	58	30.14	3.92
	64	39.04	5.75
	70	50.28	8.87

REMARKS.

REMARKS.

THE single payments in this table are the excesses multiplied by 10 of the values of female lives in Table XLVII. above the values of the joint lives of males and females in Tables XLVIII. and XLIX. And the annual payments are the quotients arising from dividing the single payments by the values of the joint lives increased by unity, agreeably to the rules in Vol. I. p. 14, 15, and 16. The annual payments, therefore, suppose that the first is to be made immediately; and that they are to be continued during the joint duration of the lives of the wife and husband. And both the *annual* and *single* payments include the *whole value* of the annuity, and consequently suppose that if one is preferred the other is excused.

One circumstance a little curious appears in this Table. It shews, that the value in a single payment of an annuity during the survivorship of one life after another (when the difference of age is not very great) is less in the younger ages, and greatest in the middle ages. This is owing to the high probabilities of living in the younger ages, in consequence of which it happens that the survivorship is postponed to a period so late as to *sink* the value of the annuity more on that account than it is *raised* by the longer duration of the survivorship.

The values in this Table would have been (supposing the ages of husbands and wives equal or nearly equal) from an 8th to a 12th or 13th lower than they are, had they been computed from the *means* between the values of the lives of males and females in Table XLVII; that is, from the values of lives in the kingdom of *Sweden* taken in the gross, without distinguishing between males and females. There is, therefore, a deficiency to this amount in such values when deduced from the common Tables of single and joint lives.

In Vol. I. p. 133, an account has been given of an institution in the duchy of *Oldenberg*, which provides annuities for widows, at prices specified in Tables correctly calculated by Mr. *Oeder*, from the values of single and joint lives according to Mr. *Susmilch's* Table of Mortality. Another institution of the same kind at *Hamburgh*, has been described in p. 189 of the former Volume. And, lately, an account has been sent me, by Mr. *Oeder*, of a new institution for the same purpose, established in *Denmark* and *Norway*, under the sanction and guaranteeship of his *Danish* Majesty.

The office for Equitable Assurances in *Chatham-Place*, *London*, includes also in its plan a like provision for widows. And these are all the annuity institutions, with which I am acquainted, that are guided in this instance by the lights derived from correct observations and mathematical principles. But hitherto it has not been possible for any of them, in calculating the contributions necessary to support the annuities, to be governed by any regard to the longer duration of the lives of women. It has been just observed, that this renders the payments from an 8th to a 12th or 13th *too little* for such annuities, when deduced from any tables which give (as all Tables have hitherto done) only the values of lives in general, without any discrimination between males and females. But it will be of use here to shew, by the following comparisons, the particular differences between the payments for such annuities as determined *accurately* for a whole kingdom, and the payments required, without regarding the longer duration of the lives of females, by the Tables of the four institutions just mentioned.

COMPARISON of the Values, in the preceding Table, of a Life Annuity to a Wife after her Husband, with the Values of the same Annuity in the Tables of the *Danish* and *Oldenberg* Institutions, calculated on the Supposition of the Improvement of Money at an Interest of 4 *per cent.*

Annuity 10*l.*

Wife's Age.	Husband's Age.	Value of the Annuity.				
		By Table I.		By *Oldenberg* Tables.		By *Danish* Table.
		Single Payment.	Annual Payment.	Single Payment.	Annual Payment.	Single Payment.
		£.	£.	£.	£.[a]	£.
20	20	31.90	2.03	29.82	2.11	
	26	37.28	2.46	34.34	2.60	35,74
	50	73.05	6.31	69.93	6.70	69.11
28	28	32.64	2.28	29.94	2.41	31.15
	34	38.25	2.77	36.30	2.84	35.50
	52	66.94	6.14	63.10	6.54	
42	42	34.62	3.00	30.72	3.34	30.00
	48	41.81	3.86	38.24	4.06	38.27
	60	64.25	7.49	55.84	7.18	57.00
35	35	33.55	2.55	31.36	2.74	31.45
	40	40.00	3.20	36.26	3.30	36.63
	60	76.09	8.59	67.44	8.36	68.49

[a] In the *Oldenberg*, and also in the *Hamburgh* Tables, these are *half*-yearly payments which I have doubled, and reckoned equivalent to *yearly* payments beginning immediately, and which therefore are over-rated, as may be learnt from the observations in p. 30, Vol. I. The Table for *Denmark* gives only the single payment.

COMPARISON of the Values in Table L. of a Life Annuity for a Wife after her Husband, with the Values of the same Annuity in the Tables of the *Hamburgh* and *Equitable Institutions*, calculated at an Interest of 3 *per cent.*

Annuity 10*l.*——Interest 3 *per cent.*

Wife's Age.	Husband's Age.	Value of the Annuity.					
		By *Sweden* Table.		By *Hamburgh* Tables.		By Equitable Society.	
		Single Payment.	Annual Payment.	Single Payment.	Annual Payment.	Single Payment.	Annual Payment.
		£.[b]	£.[b]	£.	£.	£.[c]	£.[c]
20	20	44.00	2.51	40.17	2.27	45.05	2.97
	26	50.62	3.01	47.47	2.85	49.82	3.40
	50	85.82	6.93	86.76	7.60	81.15	7.04
28	28	43.40	2.74	40.30	2.73	43.74	3.14
	34	50.40	3.33	48.08	3.52	49.14	3.67
	52	84.64	7.21	79.40	7.40	73.72	6.75
35	35	43.03	2.99	39.80	2.80	42.16	3.31
	40	50.44	3.70	45.81	3.54	47.25	3.86
	60	92.82	9.88	82.14	9.40	77.11	8.35

[b] In computing these payments, the values of lives at 3 *per cent.* according to the *Sweden* Tables, have been deduced from the values at 4 *per cent.* by the rules in p. 221, &c. Vol. I.

[c] These payments may be easily deduced, either from the Tables in this collection of the values of single and joint lives, according to the *Northampton* Observations, or from Table XL.

For example. It appears from this last Table, that the annuity for a life aged 20 after another of the same age, to which either a single payment of 27.96*l.* or an annual payment of 1.848*l.* during the joint lives will entitle an expectant, is 6.207*l.*; from whence it will follow, by the rule of proportion, that the annuity being 10*l.* the single payment must be 45.05*l.* and the annual payment 2.97*l.*

From these comparisons it appears that, supposing interest at 4 *per cent.* and the *Sweden* Tables a proper standard (and till similar observations are made in other kingdoms they ought to be reckoned the properest) the payments required by the *Danish* establishment are somewhat too little. The same appears to be true of the *single* payments in the *Oldenberg* establishment; but the *annual* payments in this establishment appear to be more than the value.[d]

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[d] Agreeably to this observation, Mr. *Oeder*, in the examination mentioned in Vol. I. p. 135, found the single payments deduced from Mr. *Susmilch's* Table of mortality to be frequently too little, but the annual payments almost always too great. This is to be accounted for in the following manner:

The values of single and joint lives are greater by the *Sweden* Table of mortality, than by either Mr. *Susmilch's* or the *Northampton* Table; and had they been greater in the same proportion, the *difference* between them, that is, the value in one present payment of an annuity for the life of a woman after her husband, would have been nearly the same according to all the Tables; and consequently this difference, divided by the *greater* value of the joint lives according to the *Sweden* Table, would have given a less quotient; that is, a less value of the annuity in annual payments. But the value of the single female life being greater in *proportion* by the *Sweden* Table than that of the joint lives, the difference is increased, but not so much as to produce, when divided by the greater value of the joint lives, a quotient equal to that produced by dividing a smaller difference resulting from the other Tables by a smaller value of the joint lives.

The *Danish* establishment makes the annuities payable only during widowhood, and on this account makes an abatement in the contributions; but it is impossible to determine properly what this abatement ought to be.——It has, In the HAMBURGH establishment it appears, that, if money is improved at no higher rate than 3 *per cent.* the *single* payments are almost always too low, but the *annual* payments sometimes too high. With respect to the EQUITABLE Society, it appears, that on the same supposition of no higher improvement of money than at an interest of three *per cent.* the single payments are generally too little, but the annual payments generally too high; and that when compared with the values at 4 *per cent.* and the difference of age is not very great, they are near a *third* or a *quarter* too high. It seems, therefore, that in those cases of survivorship where there was most reason to suspect, that the NORTHAMPTON Tables might give values unfavourable to the Society,

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has, I have said, the advantage of being guaranteed by the King of *Denmark* for all his dominions. It has also the following securities. All the military and naval, and other officers who receive their pay from the King's treasury, are obliged, when appointed, to give up to this fund one month of their pay; and all subscribers are obliged on admission to contribute 10 *per cent.* more than the payments in the Tables.—I will add, that the calculations for this establishment, like those for the *Hamburgh* and *Oldenberg* establishments, have been made with such pains and ability from Mr. *Susmilch's* Table of mortality (in his *Gottliche Ordnung*, Vol. II. p. 319) by two of the first *Danish* mathematicians (Mr. *Lous*, Professor of Mathematics and Navigation in the Academy of *Sea Cadets*; and Mr. *Bugge*, Professor of Astronomy in the University of *Copenhagen*; and both of them Fellows of the Royal *Danish* Academy of Sciences) that there is not the least danger of its sharing the same fate with a former *Danish* establishment described in Vol. I. p. 132.

Society, it gives them sufficiently high; and that consequently, even in these cases, there is no reason for continuing that addition of 15 *per cent.* to all the values which has been ordered by the Society.——Upon the whole; I cannot help thinking that this Society ought once more to lower its demands, and to content itself with the advantage it derives from computing by the *Northampton* Tables at so low an interest as 3 *per cent.* without making any additional charge, except, perhaps, such a small charge as that proposed in Vol. I. p. 187, towards bearing the expences of management.*

In order to prove this more fully, I will here add a comparison, in a few instances, of the *premiums* (exclusive of the additional charge) required for assurances on single lives by this Society, with the values of the same assurances deduced from the SWEDEN Tables.

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* See note, p. 372.

Values of the Assurance of 100*l.* on a Single Life.——Interest 3 *per cent.*

Age.	For *one* year by Sweden Tables.			For *seven* years by Sweden Tables.			For the *whole* Life by Sweden Tables.		
	Equit. Society Payment.	Male Payment.	Female Payment.	Equit. Society Annual Paymt.	Male Annual Payment.	Female Annual Payment.	Equit. Society Annual Paymt.	Male Annual Payment.	Female Annual Payment.
20	1.36	.87	.71	1.47	.92	.76	2.18	1.80	1.64
28	1.53	1.03	.98	1.68	1.13	1.11	2.55	2.20	2.03
35	1.81	1.22	1.16	1.93	1.32	1.21	3.06	2.85	2.44
44	2.27	1.87	1.64	2.46	2.00	1.60	3.78	3.65	3.24

It appears from hence, that without the charge of 15 *per cent.* and reckoning interest so low as 3 *per cent.* the *premiums* for Assurances on Single Lives required by the Equitable Society are, in many cases, above a *third*; and, in general, above a *quarter* greater than the true values for *mankind at large*, deduced from the SWEDEN Observations. And yet such is the temptation to bad lives to seek admission, such the uncertainty what the rate of mortality in the Society may in the end prove, and such the necessity on these accounts (as has been before observed) of securing the permanency of the Society by erring rather on the side of *excess* than *defect*, that these premiums, were no addition made to them, could not reasonably be thought exorbitant.

In the last comparison there are two circumstances which may deserve the notice of this Society.

The price in annual payments of the assurance of a female life at 28 for seven years is, according to the *Swedish* Tables, almost equal to the price of the same assurance at 35. And at 44 the *annual* payment for *seven* years is less than the *single* payment for assuring only the first of these 7 years. These circumstances, instead of being, as they may seem, the effect of errors in the *Swedish* Tables, shew a correctness not to be found in any other tables. Females whose ages are between 27 and 36 consist chiefly of *child-bearing* women; and though, taking the whole duration of marriage, the lives of *married* women may (agreeably to Mr. *Muret's* Observations in *Switzerland*, already mentioned) be *less* hazardous than the lives of *single* women, yet at these ages they may be *more* so; and particularly in great towns and polished societies, where absurd customs, wrong management, and a pernicious delicacy, render an event dangerous which is naturally safe.[f] According to Mr. *Susmilch's* observations in *Germany*, one birth in a hundred produces the death of the mother; but in *London* the proportion is much higher. This suggests the true reason of the first of the circumstances I have mentioned.——With respect to the other, it must be considered, that at 44 the critical period raises the value of the assurance of a female life; but recovering after this period particular firmness, an assurance for seven or eight years becomes less in *annual* value than an assurance for only one or two years. See p. 408.

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[f] In the *Equitable Society*, though established 50 years, and assuring the lives of women at all ages, I do not believe there are six instances of a claim's having been produced by *child-birth*. M.

In p. 182 of the preceding volume, an account has been given of the mortality among the persons assured by the Society for 12 years to 1780. I can now add, that during 14 years to *January* 1782, the number assured (exclusive of assurances on survivorships for different sums not exceeding 2000*l.* on any single life) has been 12,891, and that of this number 9890 have been persons under 50 years of age, among whom the deaths have been fewer, in the proportion of 3 to 4, than those which should have happened according to the *Northampton* Table of Observations,[g] and correspond best at

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[g] During 33 years, from Jan. 1768 to Jan. 1801, the number of assurances on single lives had been 83,201, of which number 60,597 were on the lives of persons under 50 years of age, among whom the deaths were fewer than those in the *Northampton* Table in the proportion of 4 to 7. Between the ages of 50 and 60 the number of assurances on single lives had been 15,779, and compared with the *Northampton* Table the number of deaths had been as 5 to 7. Between 60 and 80 years of age, the number of assurances on single lives had been 6825, and among them the decrements compared with those in the *Northampton* Table were in the ratio of 3 to 4 nearly.—See a further account of this Society in a note p. 191 of the 1st volume. M.

every age to the mortality exhibited in the *Sweden* Table. Of the remaining assurances, 1997 have been on single lives between 50 and 60, among which the mortality, compared with that exhibited in the *Northampton* Table, has been as 9 to 10. There have been in the same period 504 assurances of persons between 60 and 70, and among them the mortality has been nearly equal to that in the *Northampton* Table.——This great success at the outset of the institution, has been particularly favourable to it, and must strengthen it for all future time; but it would be wrong to rely on the continuance of it. Seasons of uncommon mortality must come; and the increasing credit and numbers of the Society will, as I have before observed, increase the danger of the intrusion of bad lives.

TABLE LI.

Shewing the Probabilities of the Duration of Human Life at all Ages, in a Kingdom at large; deduced from Observations in the Kurmark of BRANDENBURGH; and formed on the Supposition that a *Third* of a Kingdom consists of Inhabitants of Towns; and *Two Thirds* of the Inhabitants of Country Parishes and Villages. See Mr. *Susmilch's* GOTTLICHE ORDNUNG, VOL. III. Tables p. 33.

Decrements of Life in the Kurmark of BRANDENBURGH.

Age.	A In *Berlin*, the capital.	B In the other Towns.	C In the Country Parishes and Villages.	D $\frac{A+B+4C}{6}$
Still-born	40	34	44	42
Under 1	254	194	187	199
1— 5	185	196	138	156
0— 5	479	424	369	397
5—10	40	61	59	56
10—15	10	17	24	20
15—20	16	17	22	20
0—20	545	519	474	493
20—25	34	18	28	27
25—30	46	25	25	29
30—35	37	24	26	28
35—40	49	40	32	36
40—45	36	31	33	33
45—50	37	42	36	37
50—55	38	47	40	41
55—60	42	58	55	53
20—60	319	285	275	284

TABLE LI. continued.

Age.	A. In *Berlin*, the capital	B. In the other Towns.	C. In the Country Parishes and Villages.	D. $\frac{A+B+4C}{6}$
60— 65	31	46	63	55
65— 70	32	56	61	55
70— 75	27	35	58	49
75— 80	23	32	34	32
80— 85	11	16	22	19
85— 90	7	8	8	8
90— 95	3	2	3	3
95—100	2	1	1	1
Above 100	0	0	1	1
60—100	136	196	251	223
	1000	1000	1000	1000

From Column D the following Table has been formed.

Born 10,000—Still-born 42.

Age.	Living.	Decrements.	Proportion dying annually.	Sum of all the Living.	Expectations.
0	958	199	1 of $4\frac{3}{4}$	29877	30.68
1	759	70	1 of 11	28918	
2	689	38	1 of 18	28159	
3	651	26	1 of 25	27470	
4	625	22	1 of 28	26819	
5	603	19	1 of 32	26194	42.93
6	584	14	1 of 42	25591	
7	570	10	1 of 57	25007	
8	560	8	1 of 70	24437	
9	552	5	1 of 110	23877	
10	547	4	1 of 137	23325	42.14

TABLE LI. continued.

Age.	Living.	Decrements.	Proportion dying annually.	Sum of all the Living.	Expectations.
11	543	4	1 of 136	22778	
12	539	4	1 of 135	22235	
13	535	4	1 of 134	21696	
14	531	4	1 of 133	21161	
15	527	4	1 of 132	20680	38.64
16	523	4	1 of 131	20103	
17	519	4	1 of 130	19580	
18	515	4	1 of 129	19061	
19	511	4	1 of 128	18546	
20	507	5	1 of 101	18035	34.52
21	502	5	1 of 100	17528	
22	497	5	1 of 99	17026	
23	492	5	1 of 98	16529	
24	487	5	1 of 97	16037	
25	482	6	1 of 80	15550	31.76
26	476	6	1 of 79	15068	
27	470	6	1 of 78	14592	
28	464	6	1 of 77	14122	
29	458	6	1 of 76	13658	
30	452	6	1 of 75	13200	28.70
31	446	6	1 of 74	12748	
32	440	6	1 of 73	12302	
33	434	6	1 of 72	11862	
34	428	6	1 of 71	11428	
35	422	7	1 of 60	11000	25.56
36	415	7	1 of 59	10578	
37	408	7	1 of 58	10163	
38	401	7	1 of 57	9755	
39	394	7	1 of 56	9354	
40	387	7	1 of 55	8960	22.65

TABLE LI. continued.

Age.	Living.	Decrements.	Proportion dying annually.	Sum of all the Living.	Expectations.
41	380	7	1 of 54	8573	
42	373	7	1 of 53	8193	
43	366	7	1 of 52	7820	
44	359	7	1 of 51	7454	
45	352	7	1 of 50	7095	19.65
46	345	7	1 of 49	6743	
47	338	7	1 of 48	6398	
48	331	7	1 of 47	6060	
49	324	7	1 of 46	5729	
50	317	8	1 of 40	5405	16.55
51	309	8	1 of 39	5088	
52	301	8	1 of 38	4779	
53	293	9	1 of 32	4478	
54	284	9	1 of 31	4185	
55	275	10	1 of 27	3901	13.68
56	265	10	1 of 26	3626	
57	255	10	1 of 25	3361	
58	245	11	1 of 22	3106	
59	234	11	1 of 21	2861	
60	223	11	1 of 20	2627	11.28
61	212	11	1 of 19	2404	
62	201	11	1 of 18	2192	
63	190	11	1 of 17	1991	
64	179	11	1 of 16	1801	
65	168	11	1 of 15	1622	9.15
66	157	11	1 of 14	1454	
67	146	11	1 of 13	1297	
68	135	11	1 of 12	1161	
69	124	11	1 of 11	1016	
70	113	10	1 of 11	892	7.48

TABLE LI. continued.

Age.	Living.	Decrements.	Proportion dying annually.	Sum of all the Living.	Expectations.
71	103	10	1 of 10	779	
72	93	10	1 of 9	676	
73	83	10	1 of 8	583	
74	73	9	1 of 8	500	
75	64	8	1 of 8	427	6.17
76	56	7	1 of 8	363	
77	49	6	1 of 8	307	
78	43	6	1 of 7	258	
79	37	5	1 of 7	215	
80	32	5	1 of 6	178	5.06
81	27	4	1 of 7	146	
82	23	4	1 of 6	119	
83	19	3	1 of 6	96	
84	16	3	1 of 5	77	
85	13	2	1 of 6	61	4.18
86	11	2	1 of 5	48	
87	9	2	1 of 4	37	
88	7	1	1 of 7	28	
89	6	1	1 of 6	21	
90	5	1	1 of 5	15	
91	4	1	1 of 4	10	
93	3	1	1 of		
95	2	1	1 of		
100	1	1	1 of		
		1	1 of		

REMARKS.

THIS Table is the same with that published in the last edition of Mr. *Susmilch's*

Gottliche Ordnung, with the addition of the *Expectations*, and an alteration in the arrangement of the number of the still-born, which I have placed by itself, and deduced from the *whole* number born, in order to make the number *born alive* the *radix* of the Table.

This Table, it should be further observed, has been formed without any regard to the correction explained in the Second Essay in this Volume; and, on this account, (as far as it has been deduced from the numbers dying at every age in the towns of *Brandenburgh*) makes the probabilities of living too high in the first stages of life. But it should be likewise attended to, that on *another* account, it makes them in a much greater proportion too low. I mean, on account of the great excess of the births above the burials in the country parishes and villages. The effect of such an excess may be learnt from what is said in p. 253, &c. of the Introduction to these Tables.

There is another Table of the probabilities of living at every age in a kingdom at large, in the Second Volume of Mr. *Susmilch's Gottliche Ordnung*, p. 319, which has been made the *basis* of all the computations in GERMANY of the values of payments dependent on lives. This is the Table referred to in p. 434, and in the Note, p. 438. It differs but little from this Table; and is liable to the same objections. I must add, that the like is true of a table formed with the same view, and on the same principles, by Mr. FLORENCOURT, the ingenious author of a Mathematical Treatise on Political Arithmetick, published in *Germany*, in 1781.

Having occasion to mention these two writers, I cannot help adding with regret, that being ignorant of the *German* language, I have found myself incapable of profiting by their works in the manner I wish.

In Tables 12th, 13th, 20th, 21st, and 24th, at the end of the Second Volume of Mr. SUSMILCH's *Gottliche Ordnung*, the decrements of life at all ages are given separately for males and females in BERLIN for 14 years; in the parish of St. *Sulpice*, PARIS, for 30 years; and in several country parishes and villages in BRANDENBURGH for different periods of years. These decrements are so far from giving a just representation of human mortality, that a table of *observations* deduced from them would necessarily be very erroneous. They confirm, however, the difference in favour of females exhibited in the four preceding Tables; and therefore it will not be improper to insert a summary of them.

TABLE LII.

DECREMENTS of Life.

Age.	In St. SULPICE Parish.		In BERLIN.		Country Parishes in BRANDENBURGH.	
	Males.	Females.	Males.	Females.	Males.	Females.
Still-born			360	253	45	39
1	5718	4615	2758	2370	420	383
1— 5	5925	6098	842	847	276	246
5—10	1597	1536	211	215	120	110
10—20	789	749	196	205	87	72
20—30	1293	1337	709	493	126	97
*30—45	2207	2315	1052	796	166	168
45—60	2026	2442	1023	746	280	234
60—70	1768	2177	443	506	237	207
70—80	1453	3505	337	417	148	183
80—90	648	1073	114	160	68	48
90—95	28	101	11	29	8	8
95—100	19	72	9	22	2	1
Above 100	0	0	1	4	7	2
Totals	24071	24467	806[illegible]	7063	1990	1798
*30—40			725	582	102	124
40—50			652	445	151	103
50—60			698	515	193	175

The decrements in the country parishes in *Brandenburgh* are too great in the first stages of life on account of the excess of the births above the burials, the former having been, in some of these parishes, more than *double* the latter. The decrements in *Berlin,* on the contrary, are too small, for reasons sufficiently explained in the course of this work; but in the parish of St. *Sulpice, Paris,* they are particularly erroneous, for the reasons mentioned in the Postscript to the First Essay in this Volume, p. 64, 65.

THERE have been now given in this collection, tables of the duration and values of human life in great cities, in moderate towns, in country villages and parishes, and among the inhabitants of a whole kingdom, consisting of all *country* as well as *town* inhabitants. The accounts which have been given of the *data* from which they have been formed, and of the method of forming them, shew how far they are to be reckoned just representations of the duration and values of lives in the different situations I have mentioned. But there is one remark which is applicable to all of them; and that is, that having been formed from observations on whole bodies of people of all ages and conditions, they cannot give a correct representation of the duration and values of such lives as form a body of *state* annuitants, or of persons on whose lives annuities have been purchased to commence either immediately or at any given future year. The reason is obvious. Such a body of annuitants are likely to consist of a *selection* of the best lives from the common mass; the interest of every person who purchases an annuity on any life requiring that he should take care that it is a good life[*]. Tables of mortality for such lives have been published by Mr. *De Parcieux*, in *France*, from the lists of the *French Tontines*; and by Mr. *Kersseboom*, in *Holland*, from some registers of *Dutch* annuitants. That nothing on this subject may be wanting which I am able to furnish, I shall here insert those Tables, with the addition of the expectations of life for every fifth year, according to each of them.

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[*] The following account of the life-annuities sold by our government, will, in some measure, prove the truth of

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of this observation.———There were granted in 1745, 22,500*l.* *per ann.* In *January*, 1782, they were reduced by deaths to 18,104*l.* which is a reduction of two-fifths in 36 years, and a slower decrease than the highest of the preceding Tables of mortality shew in the same time among bodies of people, all 30 years of age. The same is true of the annuities sold in 1746, which, in *Jan.* 1782, were reduced from 45,000*l.* (their original amount) to 24,400*l.* But the decrease has been slowest in the annuities granted in 1757, which, in *Jan.* 1782, had fallen from 33,750*l.* to 27,069*l.*; that is, only a *fifth* in 24 years.

TABLE LIII.

Shewing the Decrements and Expectations of Life among Bodies of Life-Annuitants, according to the Tables of Mortality published by Mr. *Kersseboom*, and by Mr. *De Parcieux*[b].

Age.	By Mr. Kersseboom.			By Mr. De Parcieux.		
	Living.	Decr.	Expectat.	Living.	Decr.	Expectat.
0	1400	275	34.47	10000	2550	34.79
1	1125	50	41.77	7450	362	45.52
2	1075	45	42.69	7088	265	46.82
3	1030	37	43.53	6823	205	47.62
4	993	29	44.14	6618	150	48.09
5	964	27	44.45	6468	123	48.19
6	947	17		6345	102	
7	930	17		6243	91	
8	913	9		6154	81	
9	904	9		6073	69	
10	895	9	42.71	6004	58	46.76
11	886	8		5946	49	
12	878	8		5897	43	
13	870	7		5854	39	
14	863	7		5815	37	

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[b] The copy here given of Mr. *De Parcieux's* Table is not that published by Mr. *De Moivre* at the end of his Book on the *Doctrine of Chances*; and by Mr. *Ferguson* in his *Tables and Tracts*, &c. p. 289; but an improved copy published by Mr. *Florencourt* in *Germany*, at the end of his Treatise on *Political Arithmetick*.

A comparison of the expectations will shew a considerable difference between this Table and Mr. *Kersseboom's*; and one reason of this difference may be, that Mr. *Kersseboom's* Table has been formed *partly* from observations on the mortality of the inhabitants of some *Dutch* villages.

TABLE LIII. continued.

	By Mr. Kersseboom.			By Mr. De Parcieux.		
Age.	Living.	Decr.	Expectat.	Living.	Decr.	Expectat.
15	856	7	39.55	5778	38	43.46
16	849	7		5740	41	
17	842	7		5699	44	
18	835	9		5655	47	
19	826	9		5608	50	
20	817	9	36.31	5558	52	40.08
21	808	8		5506	53	
22	800	8		5453	54	
23	792	9		5399	55	
24	783	11		5344	56	
25	772	12	33.27	5288	57	37.01
26	760	13		5231	58	
27	747	12		5173	57	
28	735	12		5116	56	
29	723	12		5060	55	
30	711	12	30.92	5005	54	33.96
31	699	12		4951	54	
32	687	12		4897	53	
33	675	10		4844	52	
34	665	10		4792	52	
35	655	10	28.36	4740	52	30.73
36	645	10		4688	51	
37	635	10		4637	49	
38	625	10		4587	49	
39	615	10		4538	48	
40	605	9	25.49	4490	49	27.80
41	596	9		4441	49	
42	587	9		4392	50	

TABLE LIII. continued.

Age.	By Mr. Kersseboom.			By Mr. De Parcieux.		
	Living.	Decr.	Expectat.	Living.	Decr.	Expectat.
43	578	9		4342	51	
44	569	9		4291	52	
45	560	10	22.34	4239	53	23.77
46	550	10		4186	54	
47	540	10		4132	55	
48	530	12		4077	56	
49	518	11		4021	57	
50	507	12	19.41	3964	59	20.24
51	495	13		3905	62	
52	482	12		3843	66	
53	470	12		3777	70	
54	458	12		3707	76	
55	446	12	16.72	3631	81	16.88
56	434	13		3550	85	
57	421	13		3465	88	
58	408	13		3377	91	
59	395	13		3286	95	
60	382	13	14.10	3191	99	13.86
61	369	13		3092	102	
62	356	13		2990	105	
63	343	14		2885	107	
64	329	14		2778	109	
65	315	14	11.56	2669	110	11.07
66	301	14		2559	111	
67	287	14		2448	112	
68	273	14		2336	113	
69	259	14		2223	114	
70	245	14	9.15	2109	116	8.34
71	231	14		1993	119	

TABLE LIII. continued.

Age.	By Mr. Kersseboom.			By Mr. De Parcieux.		
	Living.	Decr.	Expectat.	Living.	Decr.	Expectat.
72	217	14		1874	125	
73	203	14		1749	132	
74	189	14		1617	138	
75	175	15	6.81	1479	142	5.79
76	160	15		1337	139	
77	145	15		1198	134	
78	130	15		1064	128	
79	115	15		936	124	
80	100	13	5.05	812	115	4.73
81	87	12		697	107	
82	75	11		590	98	
83	64	9		492	88	
84	55	10		404	77	
85	45	9	3.38	327	66	3.45
86	36	8		261	55	
87	28	7		206	47	
88	21	6		159	42	
89	15	5		117	37	
90	10	3	2.47	80	30	1.79
91	7	2		50	22	
92	5	2		28	14	
93	3	1		14	8	
94	2	1		6	3	
95	1			3	2	
96	0.6			1	1	
97	0.5			0	0	
98	0.4					
99	0.2					
100	0.0					

TABLE LIV.

Shewing the Values of Single Lives according to the Probabilities of the Duration of Life in Mr. *De Parcieux's* Table of Mortality.——See Mr. *Florencourt's* Dissertations on Political Arithmetick, p. 288.

INTEREST 5 *per cent.*

Age.	Value.	Age	Value.	Age.	Value.	Age.	Value.
0	11.083	26	15.040	52	10.926	78	3.953
1	14.620	27	14.969	53	10.673	79	3.719
2	15.135	28	14.893	54	10.418	80	3.501
3	15.509	29	14.810	55	10.168	81	3.283
4	15.750	30	14.722	56	9.930	82	3.072
5	15.924	31	14.627	57	9.682	83	2.868
6	16.041	32	14.527	58	9.431	84	2.668
7	16.118	33	14.421	59	9.177	85	2.461
8	16.169	34	14.306	60	8.923	86	2.237
9	16.204	35	14.189	61	8.669	87	1.976
10	16.210	36	14.065	62	8.413	88	1.688
11	16.194	37	13.930	63	8.155	89	1.409
12	16.145	38	13.786	64	7.893	90	1.164
13	16.077	39	13.632	65	7.626		
14	15.994	40	13.466	66	7.351		
15	15.901	41	13.296	67	7.069		
16	15.807	42	13.116	68	6.778		
17	15.716	43	12.931	69	6.479		
18	15.631	44	12.738	70	6.171		
19	15.550	45	12.539	71	5.856		
20	15.474	46	12.333	72	5.540		
21	15.401	47	12.119	73	5.232		
22	15.328	48	11.897	74	4.942		
23	15.256	49	11.666	75	4.674		
24	15.184	50	11.425	76	4.429		
25	15.112	51	11.178	77	4.190		

From the values in this Table at 5 *per cent.* the values at all other rates of interest may be easily found by the rule in p. 221, Vol. I. But I am very happy that, on this occasion, I can inform the public, that complete tables of the values of *single* lives, deduced with perfect correctness (from the copy of Mr. *De Parcieux's* Table of Mortality at the end of Mr. *De Moivre's* Doctrine of Chances) for every rate of interest from 2 to 10 *per cent.* and also of *two joint* lives at $3\frac{1}{2}$ and $4\frac{1}{2}$ *per cent.* have been published by Mr. *Maseres,* Cursitor Baron of the Exchequer, in a work on the principles of the doctrine of life-annuities.——To this work the ingenious author has added many calculations on the best means of redeeming the public debts; and I wish his name and abilities may be the means of engaging the attention of the kingdom effectually to this most important object.

IN p. 118, Vol. I. a scheme has been mentioned for providing for the Widows and Orphans of the Clergy within the Diocese of *Exeter*, and which the Reverend Mr. *Gandy* of *Plymouth*, had, with great public spirit, but without success, endeavoured to carry into execution.

Much time and pains were employed in computing the necessary tables for this scheme; and as it is possible that in some future time they may be still of use, I shall here insert the chief of them.

TABLE LV.

Shewing the Values in Annual Payments, during the joint Lives (first Payment to be made at Admission), and also in Single Payments, of a Life-Annuity of 10*l.* to be entered upon by a Wife at the Death of her Husband.

INTEREST reckoned at 4 *per cent.*

Husband's age.	Annual payment, supposing equal ages.	Addition to annual payment for each year the age of the husband exceeds the wife's	Equivalent composition, or single payment	Addition to the single payment for each year the husband's age exceeds the wife's.
	£. s. d.	s. d.	£. s. d.	£. s. d.
25 or less	2 : 15 : 0	0 : 10	35 : 6 : 0	0 : 14 : 0
26	2 : 15 : 0	0 : 10	35 : 5 : 0	0 : 14 : 0
27	2 : 15 : 6	0 : 10	35 : 4 : 0	0 : 14 : 0
28	2 : 16 : 0	0 : 10	35 : 3 : 0	0 : 14 : 0
29	2 : 16 : 6	0 : 10	35 : 2 : 0	0 : 14 : 0
30	2 : 17 : 6	0 : 10	35 : 0 : 0	0 : 14 : 0
31	2 : 18 : 0	0 : 10	34 : 18 : 0	0 : 14 : 0

TABLE LV. continued.

Husband's age.	Annual payment, supposing equal ages. £.	s.	d.	Additional annual payments for each year the age of the husband exceeds the wife's. s.	d.	Single payment, supposing the annual excused. £.	s.	d.	Addition to the single payment for each year the age of the husband exceeds the wife's £.	s.	d.
32	2	18	6	0	11	34	16	0	0	14	6
33	2	19	0	0	11	34	14	0	0	15	0
34	2	19	6	1	0	34	12	0	0	15	6
35	3	0	0	1	0	34	10	0	0	16	0
36	3	0	0	1	0	34	8	0	0	16	0
37	3	0	6	1	1	34	5	0	0	16	6
38	3	1	0	1	1	34	2	0	0	17	0
39	3	1	6	1	2	33	18	0	0	17	6
40	3	2	0	1	2	33	14	0	0	18	0
41	3	2	6	1	3	33	10	0	0	18	6
42	3	3	0	1	4	33	6	0	0	19	0
43	3	3	6	1	5	33	2	0	0	19	6
44	3	4	0	1	6	32	17	0	1	0	0
45	3	4	6	1	7	32	12	0	1	1	0
46	3	5	0	1	8	32	6	0	1	1	6
47	3	5	6	1	9	32	0	0	1	2	0
48	3	6	0	1	10	31	14	0	1	2	6
49	3	6	6	1	11	31	8	0	1	3	0
50	3	7	0	2	0	31	2	0	1	3	6
51	3	7	6	2	1	30	16	0	1	4	0
52	3	8	0	2	2	30	9	0	1	5	0
53	3	8	6	2	3	30	1	0	1	6	0
54	3	9	0	2	4	29	12	0	1	7	0
55	3	10	0	2	6	29	3	0	1	8	0
56	3	10	6	2	7	28	14	0	1	9	0
57	3	11	0	2	9	28	4	0	1	10	0
58	3	11	6	2	11	27	14	0	1	11	0
59	3	12	0	3	1	27	4	0	1	12	0
60	3	12	6	3	3	26	13	0	1	13	0
61	3	13	0	3	5	26	2	0	1	14	0

In calculating this Table, the values of single and joint lives were taken from Tables VI. and VII. in this volume, which were then reckoned the best guides. But a comparison of these values, with those in Table L. p 431, will shew they want correction; and, particularly, that though when the ages of husbands and wives are under 40, and nearly equal, the values in this Table are a little too high; yet, in other cases, they are below, and, in some cases, *much* below the proper values.

TABLE LVI.

Shewing the Values of a Life-Annuity of 5*l.* payable to a Wife after her Husband, provided he lives *three* Years from the Time of purchasing; and of an additional Annuity of 5*l.* provided he lives *five* Years from the Time of purchasing.

Interest 4 *per cent.*

Age.	Annual payment, supposing equal ages.	Additional annual payment for each year the age of the husband exceeds the wife's	Single payment, supposing the annual excused.	Addition to the single payment for each year the age of the husband exceeds the wife's
	£. s. d.	s. d.	£. s. d.	£. s. d.
25 or less	2 : 2 : 6	0 : 9	25 : 13 : 6	0 : 11 : 10
26	2 : 2 : 6	0 : 9	25 : 13 : 6	0 : 11 : 10
27	2 : 2 : 6	0 : 9	25 : 13 : 6	0 : 11 : 10
28	2 : 2 : 6	0 : 9	25 : 13 : 6	0 : 11 : 10
29	2 : 2 : 6	0 : 9	25 : 13 : 6	0 : 11 : 10
30	2 : 2 : 6	0 : 9	25 : 13 : 6	0 : 11 : 10
31	2 : 2 : 6	0 : 9	25 : 9 : 6	0 : 12 : 1
32	2 : 2 : 6	0 : 9	25 : 5 : 6	0 : 12 : 5
33	2 : 3 : 0	0 : 10	25 : 2 : 6	0 : 12 : 9
34	2 : 3 : 0	0 : 10	24 : 18 : 6	0 : 13 : 0
35	2 : 3 : 0	0 : 11	24 : 15 : 0	0 : 13 : 4
36	2 : 3 : 6	0 : 11	24 : 10 : 6	0 : 13 : 9
37	2 : 3 : 6	1 : 0	24 : 5 : 6	0 : 14 : 1
38	2 : 3 : 6	1 : 0	24 : 1 : 0	0 : 14 : 6
39	2 : 4 : 0	1 : 1	23 : 16 : 6	0 : 14 : 10
40	2 : 4 : 0	1 : 1	23 : 11 : 6	0 : 15 : 2
41	2 : 4 : 0	1 : 2	23 : 5 : 6	0 : 15 : 7
42	2 : 4 : 0	1 : 2	22 : 19 : 6	0 : 15 : 11
43	2 : 4 : 0	1 : 3	22 : 13 : 6	0 : 16 : 4
44	2 : 4 : 0	1 : 4	22 : 7 : 6	0 : 16 : 10
45	2 : 4 : 0	1 : 4	22 : 1 : 6	0 : 17 : 8
46	2 : 4 : 0	1 : 5	21 : 13 : 0	0 : 17 : 0

TABLE LVI. continued.

Age.	Annual payment, supposing equal ages.			Additional annual payment for each year the age of the husband exceeds the wife's.		Single payment, supposing the annual excused.			Addition to the single payment for each year the age of the husband exceeds the wife's		
	£.	s.	d.	s.	d.	£.	s.	d.	£.	s.	d.
47	2	4	0	1	6	21	4	6	0	18	3
48	2	4	0	1	7	20	16	6	0	18	10
49	2	4	0	1	8	20	8	6	0	19	3
50	2	3	6	1	9	20	0	6	0	19	9
51	2	3	6	1	10	19	11	6	1	0	2
52	2	3	6	1	11	19	2	6	1	0	8
53	2	3	6	2	0	18	15	0	1	1	0
54	2	3	6	2	0	18	7	0	1	1	6
55	2	3	0	2	1	17	18	6	1	1	11
56	2	3	0	2	2	17	7	6	1	2	5
57	2	2	6	2	3	16	16	6	1	2	11
58	2	2	0	2	5	16	5	6	1	3	6
59	2	2	0	2	7	15	14	6	1	4	0
60	2	1	6	2	8	15	3	6	1	4	6
61	2	0	6	2	10	14	8	6	1	5	2
62	1	19	6	3	0	13	14	0	1	5	10

This Table has been computed by the Rule in Quest. VII. Vol. I. p. 23, taking the probabilities of the duration of life as they are in the Vth Table, and the values of single and joint lives as they are in the VIth and VIIth Tables in this Volume. The correct and legitimate Table would be a Table computed by the same rule from the SWEDEN Tables in this collection.

TABLE LVII.

Shewing the Values of 100*l.* payable to such Children, *under Age*, of a *married* Man, as shall happen to be living at the Time of his Decease, provided he leaves no Widow.

INTEREST 4 *per cent.*

Age.	Annual payment during life.	Single payment, supposing the annual excused.	Age.	Annual payment during life.	Single payment, supposing the annual excused.
	£. s. d.	£. s. d.		£. s. d.	£. s. d.
25	0 : 10 : 0	8 : 0 : 0	47	1 : 3 : 6	14 : 18 : 0
26	0 : 11 : 0	8 : 10 : 0	48	1 : 4 : 6	15 : 6 : 0
27	0 : 11 : 6	9 : 1 : 0	49	1 : 5 : 6	15 : 15 : 0
28	0 : 12 : 0	9 : 10 : 0	50	1 : 6 : 6	16 : 4 : 0
29	0 : 12 : 6	9 : 18 : 0	51	1 : 7 : 6	16 : 12 : 0
30	0 : 13 : 6	10 : 6 : 0	52	1 : 8 : 6	17 : 0 : 0
31	0 : 14 : 0	10 : 14 : 0	53	1 : 9 : 6	17 : 8 : 0
32	0 : 14 : 6	11 : 0 : 0	54	1 : 11 : 0	17 : 16 : 0
33	0 : 15 : 0	11 : 5 : 0	55	1 : 12 : 6	18 : 4 : 0
34	0 : 15 : 6	11 : 9 : 0	56	1 : 13 : 6	18 : 13 : 0
35	0 : 15 : 6	11 : 13 : 0	57	1 : 15 : 0	19 : 3 : 0
36	0 : 16 : 0	11 : 19 : 0	58	1 : 16 : 6	19 : 13 : 0
37	0 : 17 : 0	12 : 4 : 0	59	1 : 18 : 6	20 : 3 : 0
38	0 : 17 : 6	12 : 10 : 0	60	2 : 0 : 6	20 : 13 : 0
39	0 : 18 : 0	12 : 15 : 0	61	2 : 2 : 6	21 : 3 : 0
40	0 : 18 : 6	13 : 0 : 0	62	2 : 5 : 0	21 : 13 : 0
41	0 : 19 : 0	13 : 5 : 0			
42	0 : 19 : 6	13 : 10 : 0			
43	1 : 0 : 0	13 : 15 : 0			
44	1 : 1 : 0	14 : 0 : 0			
45	1 : 1 : 6	14 : 5 : 0			
46	1 : 2 : 6	14 : 11 : 0			

METHOD of CALCULATION.

LET the age be reckoned 35.——The value (interest being at 4 *per cent.*) of 100*l.* payable at the death of a person aged 35, provided he survives another person of the same age, is £14.55, by Mr. *Simpson's* Problem quoted in Question XII. Vol. I. p. 42, and by the correction explained in Vol. I. p. 35 and 69: deducing the values of the longest of the two lives from Tables VI. and VII. in this volume, by the rule in the Note p. 43, Vol. I.

This gives the value sought for this Table, on the supposition that it is *certain*, that a married man will at his death leave children under age. If one *tenth* of those who die widowers leave either no children, or none under age, then this value must be diminished, on that account, one tenth. And if, besides, one in five of all who are left widowers marry a second time wives not older than themselves, one *half* at least of whom, (that is, one *tenth* of all that are left widowers) must be reckoned to die in a 2d or 3d marriage; then the same value must be diminished again another tenth; that is, a *fifth* in all; and this will make it £11.64, (or 11*l.* 13*s.* nearly) which is the value in a *single payment* given in the Table.——Divide £11.64 by 14.98 (the value increased by unity of a life aged 25 by Table VI. in this Volume) and the quotient will be .777 (or 15*s.* 6*d.*) which is the value in annual payments during the single life, the first payment to be made immediately.

In this Table no allowance has been made for the inequality of age between a man and his wife, and for the chances of survivorship being, on this and other accounts, much against him in marriage. The values in it, therefore, are probably much too high.

Had the value just determined been deduced from the *Sweden* Tables for males and females taken collectively, it would have been in the single payment 10*l.* 16*s.*; in the annual payment 13*s.* 7*d.*——Had the wife been reckoned 29 (the husband being 35), it would have been in the single payment 9*l.* 4*s.* 6*d.*; in the annual payment 11*s.* 7*d.* ——A society, therefore, for relieving orphans on this plan, might safely adopt lower payments than those in this Table; nor would there be any danger from the admission of bad lives.

TABLE

TABLE LVIII.

Shewing the present Value of an Annuity of 10*l.* for five years; 20*l.* for the next succeeding five Years; and 30*l.* for the whole of Life after Ten Years; payable *quarterly*; and to commence at FIFTY-FIVE Years of Age.—See the Reference to this and the following Table in Vol. I. p. 148.

Age of the Purchaser.	Value of the annuity in one present payment.		Value of the annuity in annual payments, to be continued till 55, the 1st payment to be made immediately.	
	£.	s.	£.	s.
20	38	6	2	4
21	40	7	2	7
22	42	8	2	10
23	44	9	2	13
24	46	11	2	16
25	48	13	3	0
26	51	3	3	4
27	53	14	3	8
28	56	6	3	13
29	58	18	3	18
30	61	11	4	4
31	64	16	4	11
32	68	1	4	18
33	71	7	5	5
34	74	13	5	13
35	78	0	6	1
36	81	16	6	11
37	85	12	7	2
38	89	9	7	13
39	94	0	8	6
40	98	11	9	0
41	103	16	10	0
42	109	0	11	0
43	114	4	12	3
44	121	0	13	13
45	128	8	15	9

TABLE LIX.

Shewing the Values of an Annuity of 10*l.* for five Years; 20*l.* for the next succeeding five Years; and 30*l.* for the whole of Life after Ten Years; payable *quarterly*; and to commence at SIXTY Years of Age.——See Vol. I. p. 148.

Age of the Purchaser.	Value of the annuity in one present payment.		Value of the annuity in annual payments, to be continued till the age of 60, the first payment to be made immediately.	
	£.	s.	£.	s.
20	22	13	1	5
21	23	18	1	6
22	25	3	1	8
23	26	8	1	10
24	27	13	1	12
25	28	19	1	14
26	30	10	1	16
27	32	2	1	18
28	33	13	2	0
29	35	4	2	3
30	36	18	2	6
31	38	12	2	9
32	40	8	2	12
33	42	5	2	15
34	44	2	2	19
35	46	0	3	3
36	48	10	3	8
37	51	0	3	13
38	53	10	3	19
39	56	5	4	5
40	59	0	4	12
41	61	10	5	0
42	64	10	5	8
43	68	0	5	18
44	72	10	6	14
45	77	0	7	10
46	81	10	8	4
47	86	0	9	0
48	90	10	9	16
49	96	0	11	0
50	102	0	12	10

These last two Tables have been calculated by the rules in Vol. I. p. 18, 19, &c.

The probabilities of the duration of life have been supposed *nearly* the same with those in the *Northampton* Table of mortality.

The interest of money has been reckoned at 3 *per cent.*; and it must be further remembered, that the values in *each* of the 2d and 3d columns are the *whole* values.

APPENDIX.

THE following tables were computed by Dr. *Price*, at the request of a committee of the House of Commons, and were intended to form the foundation of a plan for enabling the labouring poor to provide support for themselves in sickness and old age, by small weekly savings from their wages.—A bill for establishing a plan of this kind was formed and approved by the Commons in the year 1789, but, like Mr. *Dowdeswell's* bill for the same purpose in the year 1773[a], it was rejected by the Lords. The importance, however, of these tables is not lessened by this circumstance, and it was the author's intention to have published them, had he lived to complete the present edition of this work. In order therefore to fulfil his intentions, as well as to preserve those valuable fruits of his labour from being lost, I have inserted them, together with his own explanations of their use and construction, in this Appendix; thinking that they may be rendered of great public service in some future time, should the Societies for which they were computed be hereafter established either by the legistature or by voluntary associations. M.

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[a] A copy of this bill and of the tables that were computed for it, has been published by Mr. Baron *Maseres*, in the 2d volume of his Treatise on the Doctrine of Life-annuities.

TABLE

TABLE I.

Shewing the Weekly Allowances, during Incapacities of Labour, produced by Sickness or Accidents, and the corresponding Weekly Contributions necessary to entitle Persons to those Allowances.

N. B. The Ages in this and the following Tables, are the Ages at Admission, and the Contributions at Admission are reckoned to continue invariable till they cease at Sixty-five.

	Ages of Contributors at Admission.	Under 32	From 32 to 42	From 43 to 51	From 52 to 58	From 59 to 64				Bedlying Pay.		Walking Pay.
Weekly Contributions.	Class	d.	d.	d.	d.	s.	d.	Weekly Allowances.	Class	£.	s.	s.
	I.	1	1¼	1½	1¾	0	2		I.	0	4	2
	II.	1½	1⅞	2¼	2⅝	0	3		II.	0	6	3
	III.	2	2½	3	3½	0	4		III.	0	8	4
	IV.	2½	3⅛	3¾	4⅜	0	5		IV.	0	10	5
	V.	3	3¾	4½	5¼	0	6		V.	0	12	6
	VI.	3½	4⅜	5¼	6⅛	0	7		VI.	0	14	7
	VII.	4	5	6	7	0	8		VII.	0	16	8
	VIII.	4½	5⅝	6¾	7⅞	0	9		VIII.	0	18	9
	IX.	5	6¼	7½	8¾	0	10		IX.	1	0	10
	X.	5½	6⅞	8¼	9⅝	0	11		X.	1	2	11
	XI.	6	7½	9	10½	1	0		XI.	1	4	12

SUPPOSITIONS *on which this* TABLE *is formed.*

First, That in societies consisting of persons under 32 years of age, a 48th part of them will be always in a state of incapacitation by illness and accidents; and therefore entitled to allowances proportioned to their contributions. Various reasons, and particularly the experience of friendly clubs, determine me to believe that the proportion of the sick to the well in such a society will not be so great as this; and consequently that a weekly allowance during sickness will be more than supported by weekly contributions not exceeding a 48th part of that allowance.

Secondly, It is supposed that from the age of 32 to 42 this proportion increases to one quarter more than a 48th part; from 43 to 51 to one half more; from 52 to 58 to three quarters more; and from 59 to 64 to double. The reason of assuming this rate of increase is, that the probability of the duration of human life decreases after 30 nearly in this manner, or so that a person of the age of 60 has but half the probability of living any given time that a person at 32 has, and consequently must be then doubly subject to the causes that produce sickness and mortality.

TABLE

TABLE II.

Showing the Weekly Allowances to Persons in Old Age after 65 and 70; and the correspond-

	Ages at Admission.	Class I.		Class II.		Class III.		Class IV.	
		s.	d.	s.	d.	s.	d.	s.	d.
Weekly Contributions till 65.	Under 21	0	1	0	1½	0	2	0	2½
	21 & 22	0	1¼	0	1⅞	0	2½	0	3⅛
	23 & 24	0	1½	0	2¼	0	3	0	3¾
	25 & 26	0	1¾	0	2⅝	0	3½	0	4⅜
	27 & 28	0	2	0	3	0	4	0	5
	29 & 30	0	2¼	0	3⅜	0	4½	0	5⅝
	31 & 32	0	2½	0	3¾	0	5	0	6¼
	33	0	2¾	0	4⅛	0	5½	0	6⅞
	34	0	3	0	4½	0	6	0	7½
	35	0	3¼	0	4⅞	0	6½	0	8⅛
	36	0	3½	0	5¼	0	7	0	8¾
	37	0	3¾	0	5⅝	0	7½	0	9⅜
	38	0	4	0	6	0	8	0	10
	39	0	4¼	0	6⅜	0	8½	0	10⅝
	40	0	4½	0	6¾	0	9	0	11¼
	41	0	4¾	0	7⅛	0	9½	0	11⅞
	42	0	5	0	7½	0	10	1	0½
	43	0	5½	0	8¼	0	11	1	1¾
	44	0	6	0	9	1	0	1	3
	45	0	6½	0	9¾	1	1	1	4¼
	46	0	7½	0	11¼	1	3	1	6¾
	47	0	8½	1	0¾	1	5	1	9¼
	48	0	9½	1	2¼	1	7	1	11¾
	49	0	10½	1	3¾	1	9	2	2¼
	b 50	0	11½	1	5¼	1	11	2	4¾

TABLE II. continued.

ing Weekly Contributions in early Life necessary to support those Allowances.

Class V.		Class VI.		Class VII.		Class VIII.		Class XI.		Class X.		Class XI.	
s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
0	3	0	3½	0	4	0	4½	0	5	0	5½	0	6
0	3¾	0	4⅜	0	5	0	5⅝	0	6¼	0	6⅞	0	7½
0	4½	0	5¼	0	6	0	6¾	0	7½	0	8¼	0	9
0	5¼	0	6⅛	0	7	0	7⅞	0	8¾	0	9⅝	0	10½
0	6	0	7	0	8	0	9	0	10	0	11	1	0
0	6¾	0	7⅞	0	9	0	10⅛	0	11¼	1	0⅜	1	1½
0	7½	0	8¾	0	10	0	11¼	1	0½	1	1¾	1	3
0	8¼	0	9⅝	0	11	1	0⅜	1	1¾	1	3⅛	1	4½
0	9	0	10½	1	0	1	1½	1	3	1	4½	1	6
0	9¾	0	11⅜	1	1	1	2⅝	1	4¼	1	5⅞	1	7½
0	10½	1	0¼	1	2	1	3¾	1	5½	1	7¼	1	9
0	11¼	1	1⅛	1	3	1	4⅞	1	6¾	1	8⅝	1	10½
1	0	1	2	1	4	1	6	1	8	1	10	2	0
1	0¾	1	2⅞	1	5	1	7⅛	1	9¼	1	11⅜	2	1½
1	1½	1	3¾	1	6	1	8¼	1	10½	2	0¾	2	3
1	2¼	1	4⅝	1	7	1	9⅜	1	11¾	2	2⅛	2	4½
1	3	1	5½	1	8	1	10½	2	1	2	3½	2	6
1	4½	1	7¼	1	10	2	0¾	2	3½	2	6¼	2	9
1	6	1	9	2	0	2	3	2	6	2	9	3	0
1	7½	1	10¾	2	2	2	5¼	2	8½	2	11¾	3	3
1	10½	2	2¼	2	6	2	9¾	3	1½	3	5¼	3	9
2	1½	2	5¾	2	10	3	2¼	3	6½	3	10¾	4	3
2	4½	2	9¼	3	2	3	6¾	3	11½	4	4¼	4	9
2	7½	3	0¾	3	6	3	11¼	4	4½	4	9¾	5	3
2	10½	4	4¼	4	10	5	3¾	5	9¼	6	3¼	6	9

TABLE II. continued.

		After 65.		After 70.		
		s.	d.	£.	s.	d.
Weekly Allowances for Life.	Class I.	2	0	0	4	0
	II.	3	0	0	6	0
	III.	4	0	0	8	0
	IV.	5	0	0	10	0
	V.	6	0	0	12	0
	VI.	7	0	0	14	0
	VII.	8	0	0	16	0
	VIII.	9	0	0	18	0
	IX.	10	0	1	0	0
	X.	11	0	1	2	0
	XI.	12	0	1	4	0

[b] The weekly contributions in the first class, which are equivalent to the weekly allowances after 65 and 70 in the same class, have been computed by Dr. *Price* for all the intermediate ages between 50 and 65, and are as follow:

Age.	Weekly Contribution.			Age.	Weekly Contribution.			Age.	Weekly Contribution.		
	£.	s.	d.		£.	s.	d.		£.	s.	d.
51	0	1	0½	56	0	1	11¾	61	0	6	0
52	0	1	2	57	0	2	4¼	62	0	8	0¼
53	0	1	3¼	58	0	2	9¼	63	0	12	6
54	0	1	5¼	59	0	3	4	64	1	5	0
55	0	1	8¼	60	0	4	2½				

From these sums the weekly contributions in the other ten classes may be easily obtained. But it will be seldom necessary to have recourse to them; for at a period of life so far advanced, the weekly contributions become so high in those classes as to render it almost impossible for the labouring poor to pay them. M.

Method of calculating Table II.

The rule for finding the value in a single present payment of an annuity payable for life to a person of a given age, should he survive any other given age, may be found in Volume I. Quest. 6. p. 18.

EXAMPLE.

Let the rate of interest be 3½ *per cent.* The table of the probabilities of the duration of human life, that for Northampton given in Vol. II. p. 311. and the tables of the values of lives those in Vol. II. p. 314. Also, let the given age be 20; and let the enquiry be, what sum ought to be given for an annuity of 1*l.* payable weekly for life to a person of this age, provided he should survive 65?

The value by the table just referred to, at 3½ *per cent.* of an annuity payable weekly during a life aged 65, is [c] 8.332. The probability that a life at 20 will continue in being till it is 65, is (by the other table just referred to) $\frac{1632}{5132}$; that is, it is the fraction whose numerator is the number of the living at 65, and whose denominator is the number living at 20. The value of 1*l.* payable at the end of a number of years, equal to the difference between the two ages 20 and 65, or at the end of 45 years, is (reckoning interest at 3½ *per cent.*) .2126 by Table I. Vol. II. p. 262.

£8.332 multiplied by $\frac{1632}{5132}$ is = 2.648; and this product multiplied by .2126 makes £.5629 the value required.

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[c] The values of lives at 3½ *per cent.* are not given in this table; but the *means* between the two values at 3 and at 4 *per cent.* give them with sufficient exactness.

The value of a life-annuity payable *weekly*, is worth three-tenths of a year's purchase more than the value of the same annuity payable yearly; and therefore, in all these calculations, this addition is made to every tabular value.

The value being thus found, in a single payment of an annuity of 1*l.* payable *weekly* for the life of a person of a given age after another given age; the *equivalent* value, in weekly payments, dependent on the continuance of the given life till it reaches the age it is to survive, is found by dividing the value in a single payment, by the value of an annuity payable weekly on the given life, for a term of years equal to the difference between the age of the given life and the age it is to survive[d]; which, in the present case, is for a term equal to the difference between 20 and 65, or 45 years. The value of a life age 20 for this term is £17.072. And £.5629 (the value in a single payment just found) divided by 17.072 gives £.0329 the *annual* sum payable *weekly* due from a person aged 20, for an annuity of 1*l.* payable weekly during what may happen to remain of his life after 65. The payment *per* week equivalent to this *annual* sum is, plainly, the sum divided by the number of weeks in the year; that is, £.0329 divided by 52, which will give £.00063. In like manner, an annuity of 1*l. payable* weekly may be found to be equivalent to a payment *per* week of £.0192. Since, therefore, a weekly allowance of £.0192 after 65 is worth to a person aged 20, a payment or contribution *per* week till 65 of £.00063, any other weekly allowance will be worth as much more or less than £.00063, as the allowance itself is more or less. The weekly allowance, therefore, after 65 being reckoned *two shillings* (or 0.1) the weekly contribution due for it, will be £.00328; for as .0192 is to 0.1 so is £.00063 to £.00328.

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[d] The value of a life for a term of years is found by subtracting the value of the life after the term from its whole value. Thus the value of an annuity on the whole continuance of a life aged 20, is (adding three-tenths to obtain the value of the annuity payable weekly) 17.635 year's purchase. Its value after a term of 45 years (that is, after 65) is (as shewn above) .5629 years purchase. The difference (£17.072) is its value for 46 years.—See Quest. 6th. Vol. I. page 18.

By the very same method of calculation it may be found that an allowance to a person now in his 21st year of *two shillings per* week for life after 70 years of age, is worth, in weekly contributions till he reaches 65 and subject to his death in the intermediate time, £.00171. Therefore, a weekly allowance of two shillings *per* week for life to a person in his 21st year after 65, and also an allowance of two shillings more to the same person after 70, is worth, in weekly contributions till he reaches 65 and subject to his death, £.00328 added to £.00171; that is, it is worth £.00499, which is nearly *one penny and ¼ of a farthing*.

In this manner have all the values in the 2d Table been calculated.

The value of any weekly contribution for a given term of years, dependant on the continuance of any life during that term, is 52 times the weekly contribution multiplied by the value of an annuity payable weekly on that life for the given term.—Thus, supposing the life 20 years of age, and the weekly contribution *two-pence*, 52 multiplied by .00833, and also by 17.072* (that is, £7.397) will be the value in a single present payment of that contribution dependant on the continuance of the life till 65. And this, therefore, is the sum which, according to Table II. a person under 21, if a contributor in the first Class, ought to pay, in order to be excused all subsequent payments.

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* See the Note in page 480.

TABLE III.

Shewing the Weekly Allowances during Sickness and Old Age, and the corresponding Weekly

	Ages at Admission.	Class I.		Class II.		Class III.		Class IV.	
		s.	d.	s.	d.	s.	d.	s.	d.
Weekly Contributions till 65.	Under 21	0	2	0	3	0	4	0	5
	21 & 22	0	2¼	0	3⅜	0	4½	0	5⅝
	23 & 24	0	2½	0	3¾	0	5	0	6¼
	25 & 26	0	2¾	0	4⅛	0	5½	0	6⅞
	27 & 28	0	3	0	4½	0	6	0	7½
	29 & 30	0	3¼	0	4⅞	0	6½	0	8⅛
	31	0	3½	0	5¼	0	7	0	8¾
	32	0	3¾	0	5⅝	0	7½	0	9⅜
	33	0	4	0	6	0	8	0	10
	34	0	4¼	0	6⅜	0	8½	0	10⅝
	35	0	4½	0	6¾	0	9	0	11¼
	36	0	4¾	0	7⅛	0	9½	0	11⅞
	37	0	5	0	7½	0	10	1	0½
	38	0	5¼	0	7⅞	0	10½	1	1⅛
	39	0	5½	0	8¼	0	11	1	1¾
	40	0	5¾	0	8⅝	0	11½	1	2⅜
	41	0	6	0	9	1	0	1	3
	42	0	6½	0	9¾	1	1	1	4¼
	43	0	7	0	10½	1	2	1	5½
	44	0	7½	0	11¼	1	3	1	6¾
	45	0	8	1	0	1	4	1	8
	46	0	9	1	1½	1	6	1	10½
	47	0	10	1	3	1	8	2	1
	48	0	11	1	4½	1	10	2	3½
	49	1	0	1	6	2	0	2	6
	50	1	1	1	7½	2	2	2	8½

TABLE III. continued.

Contributions for supporting those Allowances; *being Tables* I. *and* II. *combined.*

Class V.		Class VI.		Class VII.		Class VIII.		Class IX.		Class X.		Class XI.	
s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
0	6	0	7	0	8	0	9	0	10	0	11	1	0
0	6¾	0	7⅞	0	9	0	10⅛	0	11¼	1	0⅜	1	1½
0	7½	0	8¾	0	10	0	11¼	1	0½	1	1¾	1	3
0	8¼	0	9⅝	0	11	1	0⅜	1	1¾	1	3⅛	1	4½
0	9	0	10½	1	0	1	1½	1	3	1	4½	1	6
0	9¾	0	11⅜	1	1	1	2⅝	1	4¼	1	5⅞	1	7½
0	10½	1	0¼	1	2	1	3¾	1	5½	1	7¼	1	9
0	11¼	1	1⅛	1	3	1	4⅞	1	6¾	1	8⅝	1	10½
1	0	1	2	1	4	1	6	1	8	1	10	2	0
1	0¾	1	2⅞	1	5	1	7⅛	1	9¼	1	11⅜	2	1½
1	1½	1	3¾	1	6	1	8¼	1	10½	2	0¾	2	3
1	2¼	1	4⅝	1	7	1	9⅜	1	11¾	2	2⅛	2	4½
1	3	1	5½	1	8	1	10½	2	1	2	3½	2	6
1	3¾	1	6⅜	1	9	1	11⅝	2	2¼	2	4⅞	2	7½
1	4½	1	7¼	1	10	2	0¾	2	3½	2	6¼	2	9
1	5¼	1	8⅛	1	11	2	1⅞	2	4¾	2	7⅝	2	10½
1	6	1	9	2	0	2	3	2	6	2	9	3	0
1	7½	1	10¾	2	2	2	5¼	2	8½	2	11¾	3	3
1	9	2	0½	2	4	2	7½	2	11	3	2½	3	6
1	10½	2	2¼	2	6	2	9¾	3	1½	3	5¼	3	9
2	0	2	4	2	8	3	0	3	4	3	8	4	0
2	3	2	7½	3	0	3	4½	3	9	4	1½	4	6
2	6	2	11	3	4	3	9	4	2	4	7	5	0
2	9	3	2½	3	8	4	1½	4	7	5	0½	5	6
3	0	3	6	4	0	4	6	5	0	5	6	6	0
3	3	3	9½	4	4	4	10½	5	5	5	11½	6	6

TABLE III. continued.

		1st Instance		2d Instance			After 65.		After 70.	
		Bedlying Pay.		Walking Pay.						
	Class	£.	s.	£.	s.		£.	s.	£.	s.
Instances of Weekly Allowances during Sickness.	I.	0	4	0	2	Weekly Allowance during Old Age.	0	2	0	4
	II.	0	6	0	3		0	3	0	6
	III.	0	8	0	4		0	4	0	8
	IV.	0	10	0	5		0	5	0	10
	V.	0	12	0	6		0	6	0	12
	VI.	0	14	0	7		0	7	0	14
	VII.	0	16	0	8		0	8	0	16
	VIII.	0	18	0	9		0	9	0	18
	IX.	1	0	0	10		0	10	1	0
	X.	1	2	0	11		0	11	1	2
	XI.	1	4	0	12		0	12	1	4

TABLE IV.

Shewing the Fines, or Composition Money, payable at Admission by Contributors in the First Class who have commenced their Contributions at Ages above 21, and who may prefer the Payment of a Fine to an Increase of Weekly Contribution, on Account of the Excess of their Ages above 21, as specified in Table III.

N. B. The sums in the following Table are also the sums payable, at Removals, to Contributors, who, at Admission, paid Fines in lieu of an Increase of Weekly Contribution.

Age at Admission or Removal.	Weekly Contribution 2d.		Age at Admission or Removal.	Weekly Contribution 2d.		Age at Admission or Removal.	Weekly Contribution 2d.		Age at Admission or Removal.	Weekly Contribution 2d.		Age at Admission or Removal.	Weekly Contribution 2d.	
	Sums payable			Sums payable			Sums payable			Sums payable			Sums payable	
Year	£.	s.	Year	£.	s.	Year	£.	s.	Year	£.	s.	Year	£.	s.
In 22d	0	9	In 31st	4	5	In 40th	9	17	In 49th	19	16	In 58th	35	10
23d	0	18	32d	4	16	41st	10	7	50th	21	0	59th	38	6
24th	1	6	33d	5	12	42d	11	0	51st	22	5	60th	42	0
25th	1	15	34th	6	6	43d	11	16	52d	23	14	61st	46	0
26th	2	3	35th	7	0	44th	12	12	53d	25	6	62d	50	0
27th	2	12	36th	7	12	45th	13	14	54th	26	18	63d	54	0
28th	3	0	37th	8	4	46th	15	0	55th	28	13	64th	58	0
29th	3	8	38th	8	16	47th	16	10	56th	30	16	65th	62	0
30th	3	16	39th	9	7	48th	18	0	57th	33	1			

EXPLANATION *and* USES *of* TABLE IV.

THIS Table implies that all persons *under* 21 years of age entitle themselves to the expectation of their different classes, as specified in the two last columns of Table III. without paying any fine; and also that should they remove before they get into their 22d year, no money is payable by the parish they leave on that account.

If advanced into their 22d year when they enter, and do not chuse the *increase* of weekly contribution specified in Table III. under that age, this Table shews the *fine* due from them in lieu of that increase, if they enter into the 1st Class. The fines to be paid in the other classes are in proportion to the weekly contributions in those classes; and are immediately obtained from the fines in this Table. Thus, in the 2d Class they will be 13*s.* 6*d.*—in the 3d Class 18*s.*—in the 4th Class 1*l.* 2*s.* 6*d.* and so on. In like manner the fines due from persons in their 23d, 24th, 25th, 26th, &c. years, when they enter in the first Class, (that is, aged then 22, 23, 24, 25, &c.) in lieu of an increased weekly contribution, are the sums corresponding to their ages as specified in this Table; and the fines in the other classes will, as observed above, be in proportion to the weekly contributions in those classes. The sums payable at *removal* to persons who have entered under 21, but do not remove before they are turned of this age, are the same with these fines. For example:

A contributor who has entered in the first Class under 21, if he leaves the parish in which he entered in his 22d, 23d, 24th, 25th, &c. years, will be entitled, at his removal, to the sums in the Table opposite to these ages; that is, to 9*s.*—18*s.*

—1*l.* 6*s.*—1*l.* 15*s.* &c. If he has entered in the 2d Class it may be found from those sums that he will be entitled to 13*s.* 6*d.*—1*l.* 7*s.*—1*l.* 19*s.*—2*l.* 12*s.* 6*d.* &c.

If in the 3d Class to 18*s.*—1*l.* 16*s.*—2*l.* 12*s.*—3*l.* 10*s.* &c. according as he is in his 22d, 23d, 24th, 25th, &c. years respectively.

It may be a necessary observation, that it is of no consequence to a parish how many removals a contributor in any particular Class had made before he came to it, provided it receives with him the sum in the Table corresponding to his age and class. For example:

A contributor under 21 has entered in the 1st Class; that is, he has entitled himself, by taking upon him a contribution of 2*d. per* week, payable till he is 65, to an allowance, whenever he is sick or disabled, of *four shillings per* week *bedlying* pay, and two shillings *per* week *walking* pay; and also to an allowance for life after 65 of *two shillings per* week, and after 70 of *four shillings per* week. Let this person be supposed to remove to another parish in his 28th year. This Table shews that the parish he leaves ought to remit to the parish to which he removes 3*l.* Should he remove again, the second parish will be obliged to remit to a third parish the sum opposite to his age at that time; and the same is true of this third parish in case of a removal to a fourth parish; and so on.

Again: A contributor aged 22 (that is, in the 23d year of his age) has entered (let us suppose) in the 3d Class; that is, he has entitled himself, either by a weekly contribution, *without* a fine, of *four-pence halfpenny* payable till he is 65; (see Table III.) or *with* a fine and a weekly contribution of *four-pence* payable till 65, to an allowance during sickness of *eight* shillings *per* week *bedlying*

pay,

pay, and *four* shillings *per* week *walking* pay, and also to an allowance of *four* shillings *per* week *during life* after 65, and *eight* shillings *per* week after 70.—Such a contributor, should he remove in his 30th year, will, as appears by the Table, be entitled to twice 3*l.* 16*s.* or 7*l.* 12*s.* for the parish into which he removes; and should he remove again in his 40th year, he will be entitled to twice 9*l.* 17*s.* or 19*l.* 14*s.* for a *second* parish; and should he remove a third time in his 50th year, he will be entitled to twice 21*l.* or 42*l.* for a *third* parish.

METHOD *of computing* TABLE IV.

WHEN a contributor removes to a new parish, he continues there the weekly contribution with which he first entered. But to this parish he will be the same with a new contributor entering at his age; and, therefore, this parish will be entitled either to a weekly contribution suitable to that age and class, as specified in Table III. or to such a sum as will be equivalent to the value of the *difference* between his contribution and the higher contribution due from a person in that class and at that age, supposing him not to have been before a contributor. If this compensation is not made, the parish left will be a gainer at the expence of the parish to which the contributor removes; and, consequently, while the one is benefited, the other will be injured.—In other words, the parish left by a contributor is a gainer by the removal; and having no right to that gain, without being liable to sustain the burden, a sum equivalent to it ought to be transferred to the parish into which the removal is made, in order to place it on the same footing with respect to such a contributor as if he had never before been a contributor. This equivalent is the value of the *difference* just mentioned; and it must be calculated by the following rule.

Multiply the difference between the contribution to be received by the parish to which a contributor removes, and the contribution due from a person in his class and at his age, when he removes (as specified in Table III.), by the value of an annuity, payable weekly, on a life at that age, for a number of years equal to the difference between his age at removal and 65 years of age. The product will be the equivalent sum payable at his removal.

EXAMPLE.

Let a person be supposed to have made himself a contributor in the *second* Class under 21 years of age, and afterwards at 28 or in his 29th year, to remove. In this case the contribution is 3*d per* week: but in Table III. it appears that in that Class the contribution due from one at that age, supposing him then to commence his contribution, is *four-pence halfpenny per* week. The difference is *three-halfpence per* week, which is the same with *six shillings and six-pence per ann.*; and the value of this annuity, payable weekly by a person aged 28 (or in his 29th year) till he is 65, and subject to the contingency of his dying in the mean time, is (by the rule in Quest. 6th, Vol. I.) 15.80 years' purchase, reckoning interest at 3½ *per cent.* and the probabilities and values of lives as given in Tables XV. and XIX. Vol. II. This value multiplied by £.325 gives £.5.135, that is nearly 5*l.* 2*s.* 6*d.* which is in due proportion to the sum specified in this Table for the 1st Class. In this manner have all the sums in this Table been computed; and it is evident that they express not only the sums payable in all cases at removals, but also the fines payable by persons who begin their contributions at a greater age than 21, supposing them excused an *increase* of weekly contribution on that account.

The three first Tables are necessary *data* for composing the *fourth* Table. But should *fines* only be admitted on account of excess of age, no other Table would be necessary besides the fourth; and this would give great simplicity to the scheme. Perhaps, however, it may be adviseable to give an option to contributors above age at entrance, either to pay the higher weekly contributions in Table III. or to compound by paying the fines in the 4th Table. In this case the following Tables will be necessary, which exhibit the sums payable at removals to contributors at any particular ages greater than 21.[b]

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[b] These tables also (like the preceding one) exhibit the sums payable *by* those persons who shall chuse on their entrance into the club or society, to begin with such contributions as are first paid by members of any particular age less than their own, and greater than 21 years.—Thus, if a person in his 24th year wishes to be admitted into the 1st Class with contributors of 22 years of age, by beginning with a contribution of 2¼*d.* he should pay 9*s.* for such admission.—If he is in his 40th year he should pay 9*l.* 3*s.*—if in his 50th year 20*l.* 10*s.* and so on. Again: If a person in his 29th year should chuse to be admitted into the 1st Class with contributors of 23 and 24 years of age, by beginning with a contribution of 2½*d.* he should pay 1*l.* 15*s.* for such admission—if he is in his 39th year he should pay 8*l.*—if he is in his 49th year 18*l.* 14*s.* and so on. The fines payable on admission into the other classes at those respective ages are in proportion to the weekly contributions, and are easily deduced from this Table. (See Note, p. 494.) M.

TABLES, shewing the Sums payable at Removals, to Contributors who have begun their Contributions in the several Years of their Age, after the 21st, without Fines.

Table V. Class 1st.					Table VI. Class 1st.			Table VII. Class 1st.			Tab. VIII. Class 1st.			Table IX. Class 1st.			Table X. Class 1st.		
Weekly Contributions 2¼d.					2½d.			2¾d.			3d.			3¼d.			3½d.		
Age at Subscription 22 and 23.					24 & 25.			26 & 27.			28 & 29.			30 & 31.			32.		
Age at Removal.		Sums payable.			Sums payable.			Sums payable.			Sums payable.			Sums payable.			Sums payable.		
	Year	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d	£.	s.	d.	£.	s.	d.
In their	24th	0	9	0															
	25th	0	18	0															
	26th	1	7	0	0	9	0												
	27th	1	15	0	0	18	0												
	28th	2	3	0	1	6	0	0	9	0									
	29th	2	11	0	1	15	0	0	18	0									
	30th	3	0	0	2	3	0	1	6	0	0	9	0						
	31st	3	10	0	2	11	0	1	14	0	1	0	0						
	32d	4	3	0	3	6	0	2	9	0	1	12	0	0	10	0			
	33d	4	16	0	4	0	0	3	4	0	2	8	0	1	12	0	0	12	0
	34th	5	10	0	4	14	0	4	0	0	3	3	0	2	7	0	1	11	0
	35th	6	4	0	5	8	0	4	15	0	3	17	0	3	2	0	2	7	0
	36th	6	17	0	6	2	0	5	7	0	4	10	0	3	15	0	3	0	0
	37th	7	10	0	6	15	0	6	0	0	5	3	0	4	8	0	3	13	0
	38th	8	2	0	7	7	0	6	13	0	5	17	0	5	2	0	4	7	0
	39th	8	13	0	8	0	0	7	5	0	6	10	0	5	16	0	5	1	0
	40th	9	3	0	8	10	0	7	16	0	7	4	0	6	10	0	5	16	0
	41st	9	14	0	9	0	0	8	6	0	7	17	0	7	8	0	6	9	0
	42d	10	5	0	9	10	0	8	17	0	8	10	0	7	16	0	7	2	0
	43d	11	2	0	10	10	0	9	17	0	9	4	0	8	11	0	7	18	0
	44th	12	0	0	11	10	0	10	17	0	10	4	0	9	11	0	8	18	0
	45th	13	0	0	12	10	0	11	17	0	11	4	0	10	11	0	9	18	0
	46th	14	8	0	13	10	0	12	17	0	12	10	0	11	18	0	11	5	0
	47th	15	16	0	15	5	0	14	13	0	14	2	0	13	10	0	12	18	0
	48th	17	10	0	17	0	0	16	8	0	16	0	0	15	9	0	14	18	0
	49th	19	5	0	18	14	0	18	2	0	17	12	0	17	1	0	16	10	0
	50th	20	10	0	20	0	0	19	10	0	19	0	0	18	9	0	17	18	0
	51st	21	15	0	21	5	0	20	15	0	20	5	0	19	15	0	19	5	0
	52d	23	6	0	22	16	0	22	6	0	21	10	0	21	0	0	20	11	0
	53d	24	17	0	24	8	0	23	18	0	23	10	0	23	1	0	22	12	0
	54th	26	10	0	26	0	0	25	11	0	25	5	0	24	16	0	24	8	0
	55th	28	5	0	27	17	0	27	8	0	27	0	0	26	12	0	26	6	0
	56th	30	9	0	30	0	0	29	12	0	29	10	0	29	2	0	28	15	0
	57th	32	14	0	32	7	0	32	0	0	31	14	0	31	7	0	31	0	0
	58th	35	6	0	35	0	0	34	13	0	34	10	0	34	3	0	33	17	0
	59th	38	0	0	37	14	0	37	8	0	37	0	0	36	14	0	36	10	0
	60th	41	0	0	40	14	0	40	9	0	40	10	0	40	4	0	39	15	0
	61st	45	16	0	45	0	0	45	5	0	45	0	0	44	15	0	44	14	0

TABLES, shewing the Sums payable at Removals, to Contributors who have begun their Contributions in the several Years of their Age, after the 21st, without Fines.

Table XI. Class Ist.				Table XII. Class Ist.			Tab. XIII. Class 1st.			Tab. XIV. Class 1st.			Table XV. Class 1st.			Tab. XVI. Class 1st.		
Weekly Contribution 3¾d.				4d.			4¼d.			4½d.			4¾d.			5d.		
Age at Subscription 33.				34.			35.			36.			37.			38.		
Age at Removal.	Sums payable.			Sums payable.			Sums payable.			Sums payable.			Sums payable.			Sums payable.		
Year	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
In their 34th	0	15	0															
35th	1	10	0	0	15	0												
36th	2	5	0	1	10	0	0	15	0									
37th	3	0	0	2	5	0	1	10	0	0	15	0						
38th	3	15	0	3	0	0	2	5	0	1	10	0	0	15	0			
39th	4	7	0	3	13	0	2	18	0	2	3	0	1	10	0	0	15	0
40th	5	0	0	4	6	0	3	12	0	2	16	0	2	5	0	1	10	0
41st	5	14	0	5	0	0	4	6	0	3	10	0	2	16	0	2	2	0
42d	6	6	0	5	14	0	5	0	0	4	6	0	3	12	0	2	14	0
43d	7	4	0	6	11	0	5	18	0	5	5	0	4	12	0	3	18	0
44th	8	7	0	7	14	0	7	2	0	6	9	0	5	16	0	5	3	0
45th	9	7	0	8	14	0	8	2	0	7	9	0	6	16	0	6	3	0
46th	10	15	0	10	3	0	9	11	0	9	0	0	8	8	0	7	16	0
47th	12	7	0	11	15	0	11	3	0	10	11	0	10	0	0	9	8	0
48th	14	5	0	13	14	0	13	3	0	12	11	0	12	0	0	11	8	0
49th	16	0	0	15	9	0	14	18	0	14	7	0	13	16	0	13	5	0
50th	17	10	0	17	0	0	16	10	0	16	0	0	15	10	0	15	0	0
51st	18	15	0	18	5	0	17	15	0	17	5	0	16	15	0	16	5	0
52d	20	0	0	19	10	0	19	0	0	18	10	0	18	0	0	17	10	0
53d	22	0	0	21	11	0	21	0	0	20	15	0	20	5	0	19	16	0
54th	24	0	0	23	11	0	23	0	0	22	11	0	22	3	0	21	14	0
55th	26	0	0	25	12	0	25	4	0	24	15	0	24	6	0	23	17	0
56th	28	10	0	28	2	0	27	14	0	27	7	0	27	0	0	26	12	0
57th	30	10	0	30	8	0	30	1	0	29	14	0	29	7	0	29	0	0
58th	33	10	0	33	4	0	32	18	0	32	12	0	32	5	0	32	0	0
59th	36	5	0	36	0	0	35	14	0	35	8	0	35	0	0	34	14	0
60th	39	10	0	39	5	0	39	0	0	38	15	0	38	10	0	38	5	0
61st	44	9	0	44	5	0	44	0	0	43	15	0	43	10	0	43	5	0

TABLES, shewing the Sums payable at Removals, to Contributors who have begun their Contributions in the several Years of their Age, after the 21st, without Fines.

Table XVII. Class 1st.					XVIII. Class 1st.			Tab. XIX. Class 1st.			Table XX. Class 1st.			Tab. XXI. Class 1st.			Tab. XXII. Class 1st.		
Weekly Contribution 5¼d.					5½d.			5¾d.			6d.			6½d.			7d.		
Age at Subscription 39.					40.			41.			42.			43.			44.		
Age at Removal.		Sums payable.			Sums payable.			Sums payable.			Sums payable.			Sums payable.			Sums payable.		
	Year	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
In their	40th	0	16	0															
	41st	1	12	0	0	18	0												
	42d	2	6	0	1	16	0	1	0	0									
	43d	3	6	0	2	15	0	2	2	0	1	3	0						
	44th	4	10	0	3	17	0	3	2	0	2	10	0	1	5	0			
	45th	5	12	0	4	17	0	4	4	0	3	15	0	2	10	0	1	7	0
	46th	7	0	0	6	12	0	6	0	0	5	7	0	4	0	0	3	0	0
	47th	8	16	0	8	4	0	7	12	0	7	0	0	5	18	0	4	14	0
	48th	10	14	0	10	6	0	9	15	0	9	0	0	8	0	0	6	15	0
	49th	12	14	0	12	3	0	11	12	0	11	0	0	10	0	0	8	16	0
	50th	14	10	0	14	0	0	13	10	0	13	0	0	11	12	0	10	10	0
	51st	15	15	0	15	5	0	14	15	0	14	4	0	13	4	0	12	3	0
	52d	17	0	0	16	10	0	16	0	0	15	10	0	15	0	0	14	0	0
	53d	19	6	0	18	18	0	18	8	0	17	19	0	17	0	0	16	0	0
	54th	21	6	0	20	17	0	20	8	0	20	0	0	19	0	0	18	0	0
	55th	23	7	0	23	0	0	22	12	0	22	4	0	21	5	0	20	10	0
	56th	26	5	0	25	18	0	25	10	0	25	4	0	24	0	0	23	5	0
	57th	28	10	0	28	3	0	27	16	0	27	9	0	26	10	0	26	0	0
	58th	31	14	0	31	8	0	31	2	0	31	0	0	30	0	0	29	8	0
	59th	34	8	0	34	2	0	33	16	0	33	10	0	33	0	0	32	8	0
	60th	38	0	0	37	15	0	37	10	0	37	5	0	36	15	0	36	5	0
	61st	43	0	0	42	15	0	42	10	0	42	5	0	41	15	0	41	5	0

TABLES, shewing the Sums payable at Removals, to Contributors who have begun their Contributions in the several Years of their Age, after the 21st, without Fines.

Table XXIII. Class 1st.					Ta. XXIV. Class 1st.			Tab. XXV. Class 1st.			Ta. XXVI. Class 1st.			XXVII. Class 1st.			XXVIII. Class 1st.		
Weekly Contribution 7½*d.*					8*d.*			9*d.*			10*d.*			11*d.*			1*s.*		
Age at Subscription 45.					46.			47.			48.			49.			50.		
Age at Removal.		Sums payable.			Sums payable.			Sums payable.			Sums payable.			Sums payable.			Sums payable.		
	Year	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*
In their	46th	1	10	0															
	47th	3	10	0	1	14	0												
	48th	5	12	0	4	10	0	1	18	0									
	49th	7	14	0	6	12	0	4	10	0	2	2	0						
	50th	9	10	0	8	10	0	6	10	0	4	6	0	2	6	0			
	51st	11	3	0	10	3	0	8	5	0	6	4	0	4	4	0	2	10	0
	52d	13	2	0	12	3	0	10	5	0	8	5	0	6	6	0	4	4	0
	53d	15	4	0	14	5	0	12	10	0	10	10	0	8	15	0	7	0	0
	54th	17	8	0	16	10	0	15	0	0	13	0	0	11	8	0	9	12	0
	55th	19	12	0	18	15	0	17	10	0	15	15	0	14	0	0	12	6	0
	56th	22	10	0	21	14	0	20	5	0	19	0	0	17	5	0	16	0	0
	57th	25	7	0	24	12	0	23	5	0	22	0	0	20	10	0	19	0	0
	58th	28	15	0	28	0	0	26	15	0	25	10	0	24	5	0	23	0	0
	59th	31	16	0	31	4	0	30	0	0	29	0	0	27	16	0	26	12	0
	60th	36	0	0	35	10	0	34	15	0	33	18	0	33	0	0	32	0	0
	61st	41	0	0	40	10	0	39	15	0	38	18	0	38	0	0	37	0	0

NOTE.

In the original Tables the sums to be paid at removal have been computed for all the Eleven Classes at every age from 22 to 50; but I have only inserted the First Class for each age in these Tables, because the insertion of the other Ten Classes would have swelled the work without answering any essential purpose. If the sums payable at removal be known when the weekly contributions are 2¼*d.* in the 1st Column, 2½*d.* in the 2d. Column, and so on: the sums to be paid in those respective cases when the weekly contributions are 3⅜*d.*, 3¾*d*, &c. are easily obtained by the common rule of proportion. Thus, if instead of 2¼*d.* in the 1st Column, the weekly contribution had been 3⅜*d.* the sum to be paid on removal would have been a fourth proportional to 2¼*d.* 9*s.* and 3⅜*d.*; that is, expressing these numbers in decimals, it would have been $= \frac{.45 \times .014062}{.009375} = .67497 =$ 13*s.* 6*d.* or more simply $= .45 \times \frac{3}{2}$. If the weekly contributions had been 7⅞*d.* the sum to be paid on removal would have been $\frac{.45 \times .032812}{.009375} = 1.575 =$ 1*l.* 11*s.* 6*d.* or $.45 \times \frac{7}{2}$. But if the contributions had been 6¾*d.* 11¼*d.* or any other multiple of 2¼*d.* the sum to be paid would have been the same multiple of 9*s.* and therefore immediately ascertained. M.

FINIS.

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